THE

CYCLOPÆDIA;

OR,

Universal Dictionary

OF

ARTS, SCIENCES, AND LITERATURE.

VOL. XIV.
THE C Y C L O P Ä D I A;

OR,

UNIVERSAL DICTIONARY

OF

Arts, Sciences, and Literature.

BY


WITH THE ASSISTANCE OF

EMINENT PROFESSIONAL GENTLEMEN.

ILLUSTRATED WITH NUMEROUS ENGRAVINGS,

BY THE MOST DISTINGUISHED ARTISTS.

IN THIRTY-NINE VOLUMES.

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**Cyclopaedia:**

**OR, A NEW UNIVERSAL DICTIONARY OF ARTS and SCIENCES.**

**EXU**

**EXTRINSIC,** is applied, in the Schools, in various fenses.

Sometimes it signifies a thing's not belonging to the essence of another; in which sense the efficient cause and the end, or scope of a thing, are said to be extrinsic, or extrinsic causes.

Sometimes it implies a thing not being contained within the capacity of another. In which sense those causes are said to be intrinsic, which introduce something into a subject from without: as when fire introduces heat, &c.

Sometimes it denotes a thing added, or applied to another. Thus accidents and adherences are said to be extrinsic to the subject; and thus vision is extrinsic to the object seen.

**EXTUBERANTIA**, from extuber, to swell out, in Surgery, tumours situated under the skin.

**EXUBERANCE**, compounded of ex and uter, plentiful, of uter,adder, in Rhetorics, a redundancy. See Redundance, and Pleonasm.

**EXUCONTIANI**, a branch of Arian heretics. See Exoconti.

**EXVERRÆ**, in Antiquity, a kind of brush used in clearing houses, out of which a dead person had been carried.

**EXULCERATIO**, from exulcerare, to cause ulcers, in Surgery, an incipient ulceration; an excoriation.

**EXUMA** in Geography, one of the Bahama islands, situated on the coast of the Great Bank, between Stocking Isles on the S.W. and Long Ile on the E.; about 25 miles long and three broad. Although this island is almost uninhabited, it is one of the best of the Bahamas, on account of the fertility of its soil, and the excellence of its anchoring ground, in the found to which it gives name. N. lat. 24° 20'. W. long. 74° 30'.

**Vol. XIV.**

**EXU**

**EXUMA Sound,** a large channel among the Bahama islands, extending from N.W. to S.E., between Cat island or Guanabani to the east, and a range of small islands and rocks to the west and south-west: the entrance is the north of the island of Eleuthera. In this sound the whole British navy might ride in safety.

**EXUMBILICATIO**, from ex, out of, and umbilicus, the navel, in Surgery, a swelling in the situation of the navel.

**EXUPERY,** St., in Geography, a town of France, in the department of the Correze; six miles S.E. of Ufzel.

**EXUSTION,** of ex, and uno, I burn, the act of burning with fire; used in some operations by surgeons. See BURN.

**EXUVIAE,** formed from exuviae, to put off, to die, in Physiology, transient parts of certain animals, which they put off, or lay down, and assume new ones.

Such, especially, are the skins or cloaks of serpents; shells of lobsters, and the like; which are annually changed, and renewed in the spring.

The outer integument of the body, which in man and other large animals is so durably fixed on the body, is in many of the animals of the reptile kind much more loosely fixed, and is changeable several times during the period of their lives. The serpent kind all shift their skins several times in their lives, and the water-newt has been lately observed to do the same; but no creature in the world does it so often as the caterpillar, almost every species of their insects throwing off their old skin once or ten or twelve days, or less; and this in such a manner as is extremely worthy of an attentive observation. Malcolm observed that the common silk-worm changes its skin four times during its continuance in that state: the first of these changes happening at eleven or twelve days from its appearance from the egg, and
and the others at the distance of five or six days each; and probably the rest of the caterpillar kind observe nearly the same periods.

Neither is this change of the skin confined to the few creatures we have mentioned; but among the whole insect class, the most numerous of that of all animals being we know, there is scarcely one species, every individual of which does not pass through the off skin, upon the skin, before it arrives at its full growth. The term changing the skin is scarcely expressive enough for this operation in the caterpillar kinds; for the creature throws off the external covering of every the minute part and organ of its body, and the skins they thus deposit have so much the appearance of a complete insect, that they are very often mistaken for such, presenting us with every thing that we see in the external appearance of the living animal. Reaumur, Hist. Inf. vol. 1, part 1, p. 225.

Exuvia, in Agriculture, the cast-off parts of animals or their coverings, and likewise the shells and other marine productions which are met with in the bowls of the earth, when they have been deposited for a vast length of time, probably from once living creatures. These are sometimes called Extraneous Pellets, but more commonly Reliquiae, which are. They are of considerable variety, and differ greatly in their appearances. All substances of this nature are capable of much use as manures, where they can be procured in sufficient abundance, especially upon all the heavier and more flithy descriptions of soil, as they supply the calcareous principle in some degree, while they have the effect of rendering them more light and open.

EY, in our Old Writers, the name with nymph, an island, from which comes eye, a small island or islet, vulgarly called eight. Hence the names of places ending with ey denote them to be islands, as Skeppel, &c.

EYACH, in Geography, a river of Germany, in Wurttemberg, which rises about 4 miles S. of Ebingen, and runs into the Neckar, three miles above Rothenburg.

EYASIORD, a bay on the N. coast of Iceland. N. lat. 67° 50'.

EYBACH, a town of Germany, in the territory of Nuremberg; five miles S. of Nuremberg.

EYBELSTADT, a town of Germany, in the principality of Wurzburg; three miles S.S.E. of Wurzburg.

EYBENS, a town of France, in the department of the Infer; three miles S. of Grenoble.

EYBENSCHITZ, or EWINICE, a town of Moravia, in the circle of Znaim, formerly famous for an abbey of very numerous religious sects. The Hufites and Luthers worshipped in the fame church; the Calvinists had two churches; the Jews had a synagogue; besides which there were Arabu fists, Quakers, Holy Brethren of Switzerland, Photinians, &c. The inhabitants at present are chiefly Roman Catholics and Jews; 20 miles N.E. of Znaim. N. lat. 49° 8'. E. long. 16° 17'.

EYBENSTOCH, or EYBENSTADT, a town of Germany, in the circle of Erzgeburg; 20 miles S.S.W. of Chemnitz. N. lat. 50° 25'. E. long. 12° 35'.

EYCHENFILLES, a town of Germany, in the principality of Wurzburg; 12 miles S. of Gemaiden.

EYCK, HUBERT VAN, in Biography, a painter, born at Maasfey in 1430. He is regarded as the founder of the Flemish school of painting, the Giotto of Flanders; and exhibited, for that early period of art, great genius and skill. In concert with his brother John, he was celebrated for many extraordinary and curious works, executed in oil, after the latter had made his discovery of that mode of painting.

He painted well also in oil temper, but gave that up after he adopted the other. One work of his, painted in conjunction with John, was preserved in a chapel of the cathedral of Ghent. Sir Joshua Reynolds saw it there, and says of it, (see his Journey to Flanders,) "it represents the adoration of the Lamb taken from the Apocalypse: it is a great work of figures in a hard manner, but there is great character of truth and nature in the heads, and the landscape is well coloured."

It is now among the spoils of the French in the gallery of the Louvre. While it was in Ghent, (at least for a time after being wrought,) it was held in such estimation as to be shut up from public view, except on festivals; and at other times was only shewn to ambassadors or princes themselves who desired to see it.

Philip I. of Spain wished to purchase it; but that not being practicable, he employed Michael Coix to copy it, who spent two whole years about it, and received four thousand florins for his labour from the king, who placed it in the Escorial. This artif died in 1426, aged 60.

EYCK, JOHN VAN, younger brother to Hubert, was born at Maasfey in 1430, and lived with his brother, though in the end he excelled him.

To him the world is indebted for the first use of oil in painting, which he discovered in the year 1420.

Painters before this wrought their works in temper, (see Dilember,) and then to secure them from the action of air and dampness, they were accustomed to varnish them; with what composition it does not appear. Valan (Part 2, page 213, ed. 1681,) relates that Giovanni di Brugga 80 he calls him, "had painted a picture in the usual way, and having varnished it, set it to dry in the furnace, as was customary; but rather from the wood being ill-leavened and ill-cut together, or from the extreme violence of the heat, the picture was cracked and quite spoiled. He therefore deliberated how he should in future prevent accidents of this nature happening to his works, and endeavoured to make a varnish which would dry in the flake, without the necessity of expelling it to the fun.

"After many experiments, he found at last that oil of linseed and of nuts, were more efficacious than any others he had tried. These, when boiled with other ingredients, made the varnish so much wished for by him and other painters. He afterwards discovered that mixing these oils with his colours gave them a hardnes, and in drying not only equalled the water colour, but gave them more brilliancy and force, and that, without the necessity of varnishing afterwards, and he was surprized to find alo, that they united far better in oil than in water."

The fame of his discovery soon spread over Flanders and into Italy, and when he grew old, but not till then, he imparted his secret to several painters, both Flemish and Italian. And it must be confessed the art of painting is very highly indebted to him for this foundation of the wonderful success with which succeeding ages have profited by this very useful discovery.

As a painter he possessed very good talents, considering the early period of the art. He copied his heads generally from nature; his figures are seldom well compos'd or drawn. But his power of producing rich tints of picture-colours is surprizing, and their durability no lets. He paid great attention evidently to nature, but saw her in an inferior style. He laboured his pictures very highly, particularly in the ornaments which he belowed with a lavish hand, but with all the Gothic taste of the time and country in which he lived. In the gallery of the Louvre is a picture of the "Divine Beings," as he chose to call it, represented
presented by an aged man with a long beard, crowned with the pope's tiara, seated in a chair with golden circles of Latin inscriptions round his head, but without the least dignity of character, or evident action or intention. It is the very image of the art. At the earl of Pembroke's, at Wilton House, is a small picture which does him more credit. It represents the nativity of our Saviour, with the adoration of the shepherds, and the composition consists of four figures, besides the saviour and four angels, and has in the back ground the anomaly of the angels at the same time appearing to the shepherds. It is in oil, and the colours are soft of them very pure, except those of the flesh. The garment of Joseph is very rich, being glazed (see Glazing, in Painting,) thick with red lake, which is as fresh as if it were new. Almost all the draperies are so glazed with different colours, and are still very clear, except the virgin's, which, instead of maintaining its blue colour, is become a blackish green. There is a want of harmony in the work, but it is more the effect of bad arrangement of the colours than the tones of them. The glory surrounding the heads of the virgin and child is of gold. We have been the more particular in stating these circumstances of this picture, because our readers will naturally be curious to know how far the original inventor of oil painting succeeded in his works, and they will be the more convinced by this account that he went very far indeed, in what relates to the perfection of the vehicle he used, which, if I had happily been able to employ as well as he understood, the world would not have seen many better painters. He lived to practice his discovery for 31 years, dying in 1441, at the advanced age of 71.

EYDY ENGLY, in Geography, a town of Hindoosian, in Viliapep: 14 miles S. of Galgala.

EYE, in Anatomy and Physiology, the organ of vision. The eye-ball is the immediate agent in refracting the rays of light, and in collecting them into one point, so as to form an image of the object from which they are reflected. For this purpose we find in it a series of perfectly transparent parts, which execute the various refractions; a nervous pulp, on which the rays of light thus refracted make an impression to be conveyed to the fenestrum by the optic nerve; and certain membranous opaque coverings, containing the above-mentioned parts, and supporting them in their relative situations. The fusal organ, simplex, when thus considered, becomes much more complicated, if we include in our description all the apparatus added for the purposes of protection or assistance. The muscles which move the globe in various directions, the eyelids, which cover and protect it in front, and the parts which secrete the tears, and convey them into the cavity of the noftril, are all so intimately connected in situation and function with the globe, that a regard to natural arrangement leads us to include them in the same article; in which we shall consider, first, the anatomy of the whole apparatus, and afterwards the physiology of vision.

The eyes are two in number, exactly symmetrical, placed in two bony cavities, called orbits which are situated under the forehead, and separated from each other by the nose. The detailed description of the orbits will be found under the article Cranium. The figure of these cavities is that of a pyramid with four unequal sides, directed obliquely forwards, and outwards from the point to the base. The size varies but little in different individuals, and is usually independent of general stature. It exceeds considerably that of the globe, which is supported by much fat and other soft parts, so that it can be moved with great quickness and facility in every direction.

The globe of the eye is situated in the anterior part of the orbit, nearer to the internal than the external side of the cavity, and is more or less prominent in different individuals. The bafe of the orbit being truncated obliquely, the eye projects beyond its edge on the external side, while it appears more deeply buried towards the nose. It is supported in front by the moveable eye-lids; on the other sides by its muscles, which, as well the nerves and blood-vessels of the organ, are enveloped in a soft fat, filling the rest of the orbit, and keeping the eye on a level with the face. In the emaciation consequent on age or disease, this fat is absorbed, the eye loses its prominent situation, and sinks much deeper in the orbit; hence the angular edges of the bony cavity are rendered more evident, and the character of the face undergoes a marked alteration.

The size of the eye varies but little in different subjects; its apparent variety depending in great measure on the larger or smaller opening formed by the eye-lids. It is smaller in the female than in the male, and proportionally larger in the infant than in the adult. The sexual and national differences in the external proportions of the eye will be more minutely considered in the explanation of the plates, which follows the anatomical description.

The figure of the eye represents two portions of distinct spheres, of different diameters, united towards the front. The fplification of the smaller sphere is transparent, and occupies about the anterior fifth of the globe, projectimg from the larger sphere, which is opaque. By this distincion, the axis of the eye exceeds its transverse diameter a small ratio, of which we shall have occasion to speak more minutely hereafter.

The axes of the globe and the orbit are not the same; that of the latter is directed obliquely outwards, so that, if prolonged behind the apex of the pyramid, it would meet its fellow within the cranium: the axes of the two eyes are parallel, and point directly forwards. The strong cylindrical chord, made up of the optic nerve and its firm investing covering, enters the orbit in the direction of the axis of the latter, and is attached to the inner side of the posterior surface of the globe.

The globe or ball of the eye is composed of concentric membranous coats or tunicis, investing transparent parts of different densities, usually called humours. The external covering, which gives the figure to the eye, is firm and thick, formed of two distinct portions; the anterior, which is transparent, is called the cornetis; the posterior, opaque and white, the sclerotics. A certain portion of the front of the globe is covered by a membrane, which connects the ball to the lids, and is called the conjunctiva. The inner surface of the latter is lined by a thin opaque membrane of delicate structure, covered on both sides by a dark coloured pericornea, and called the choroidis; this is placed on the inner surface of its anterior part into projecting folds, the choriocapillaries, and it is connected by its front edge with another membrane, the iris, which floats transversely at a small distance from the cornea, and has a circular opening about its middle, termed the pup. The retina, a soft transparent expanse, commencing from the optic nerve, and nearly equalling the choroides in extent, lines the inner surface of that membrane. This embraces by its whole internal surface a pellucid body, occupying the greatest portion of the globe, and named the vitreous humour. In front of this, and partly imbedded in it, is placed the crystalline humour, another transparent body, nearly spherical in shape, and of greater comparative density. The space left between the latter and the cornea, is divided partially by the iris, and filled with a clear watery fluid, named the aqueous humour. The rays of light pass through the transparent cornea, the aqueous humour, the
EYE.

opening in the iris or pupil, the crystalline lens, and vitreous humour, undergoing various refractions in their passage, and are finally collected to as to form an image on some part of the concave surface of the retina, from which the impression is conveyed to the liebrum.

The choroid, or membrane of the eye.—The sclerotic coat (die fcleroc, Corn.) is the only one from the entrance of the optic nerve to the outer surface, covering about four-fifths of the globe, and transversely in front for the reception of the cornea. The external surface is covered behind and in the middle by the muscles of the eye, and the surrounding fat, and in front by the conjunctiva. The inner surface, connected with the choroid by a delicate cellular substance, by blood-vessels and nerves, is usually tinged of a dusky colour by the pigment of that membrane; an effect produced after death by transudation, since the tis is not visible in an eye examined in its most recent state. This surface is pierced by numerous small tubules, particularly about the entrance of the optic nerve, and near the origin of the cornea, by which arteries enter directly into the choroid coat; the openings are less numerous towards the middle, and give passage to veins, and to many small nerves which run through the sclerotic obliquely, for two or three lines, and lie in superficial furrows of its inner surface in their way to the ciliary circle and iris. The sclerotic presents in front an aperture nearly circular, of which the transfer is rather longer than the perpendicular diameter. The inner edge of this opening is bevelled off, and the outer passes over the opposite flapping edge of the cornea, which is thus set in the sclerotic. A small round opening, appearing on the inside as a circular spot, pierced by numerous small holes, is placed nearly in the centre of the posterior and thickest portion of the tunic, and transmits the medullary part of the optic nerve. This is equal in thickness from the upper and lower parts, but nearer to the inner or nasal, than to the outer or temporal sides of the globe. It grows gradually smaller from its commencement at the outer, to its termination on the inner surface of the sclerotic, the nerve diminishing in diameter in the same proportion in this part of its course.

The sclerotic is of a white colour. It is nearly a line in thicknesses at the back of the globe, but becomes considerably thinner at the front. Its thinnest part is near the insertion of the tendons of the recti, which is rather beyond the middle. Next to the cornea it becomes again slightly thicker. Its structure is firm and dense, confiding of flrata of fibres running parallel to and decussating each other in every direction, so as to complete a strong fibrous membrane, not separable into layers, at least not in the adult, even after very long maceration. In the fetus it may be divided into two laminae throughout its whole extent, the union between them not being very firm. In this infiance the external layer appears distinct, and totally independent of the sheath of the optic nerve. The thin internal layer is manifestly continued from the fine membrane immediately investing the nerve. The dispute, whether the firm sheath of the optic nerve derived from the dura mater expands as it reaches the bulb, and constitutes the sclerotic, is a point of little moment. The sheath and the sclerotic are evidently united most intimately, if the membrane is not continuous. Zinn describes the outer layer of the vagina of the optic nerve as collecting, before it arrives at the sclerotic, into numerous dense, shining, firm fibres, which are inserted into the posterior, thick, prominent edge of that tunic, where it is pierced by the medullary part of the nerve. The inner layer, thicker than the external, passes deeper between the nerve and the sclerotic, on the inner surface of which it gradually disappears. The difference between the sclerotic and the sheath of the nerve is marked by the sudden increase of thickness in the former, by its white colour, and by its dense structure, composed of fibres interfacing each other, the sheath of the nerve being thin, and of looser texture.

The brilliant white colour of this portion of the sclerotic covered by the conjunctiva, has been attributed to a peculiar membrane, to which the name of tunic albuginys has been given; and it has been supposed that this coat was formed by the union of the tendons which terminate in front the four straight muscles of the eye; but these tendons are not extended to the cornea, are not broad enough to unite by their edges, and are always distinct from each other, and the intervals between them are of equal brightness with the parts covered by the tendons. No such tunic in reality exists; the sclerotic shining advantageously through the transparent conjunctiva is the only cause of the brilliancy and white that.

The sclerotic is supplied by vessels from the ciliary arteries and veins; they are few in number, and capillaries in fine. We can observe in it no traces of nerves. It is elastic, and capable of undergoing very considerable extension, as observed in hydrophthalsma. The chief use of this tunic appears to be that of defending the delicate parts it contains, giving the figure to the eye, offering an insertion for its muscles, and supporting its vessels and nerves.

In the fetus it is comparatively thin and flexible; its colour is not so decided, and from its semi-transparency the colour of the choroid can be distinguished through it. It is more particularly behind that the sclerotic has a bluish tint from this cause; it is less evident anteriorly, the membrane being rendered more opaque by the tendons of the different muscles.

The cornea (horn-bone) is the transparent substance encased in the opening left at the front of the sclerotic; it occupies, therefore, about the anterior fifth of the eye. Its form is not quite circular, the transfer diameter being rather longer than the vertical. Its convexity is greater than that of the sclerotic; the cornea appears as a segment of a small sphere placed on the truncated plane of a larger. Anteriorly, it is covered by the conjunctiva, which at this part is very delicate, and adheres firmly to the cornea, giving it a shining polished surface. They are easily separable by long continued maceration. The posterior surface of the cornea is concave, and lined by the membrane of the aqueous humour, constituting the anterior limit of the anterior chamber of the eye. The circumference of the cornea, cut obliquely, slits under the edge of the sclerotic, and is covered by the conjunctiva. It is inserted in the contrary direction, so that the two parts touch by a considerable extent of oblique surfaces; the sclerotic advancing on the cornea anteriorly, while the latter passes under the sclerotic in the opposite direction. The connection is, that the anterior circumference of the cornea is less than the posterior; the chord of the segment formed by the external convexity is described by Petit as equal to five lines, that of the internal to five and a half.

The cornea and sclerotic are united to each other so intimately, that the former was for a long time regarded as a transparent continuation of the sclerotic, but the form, organization, and properties, as well as the dissections of these tunicas are so different, that we have no hesitation in considering them as distinct. Further, by long continued maceration, and then plunging the eye into boiling water, they come easily apart in a pretty regular line, the connection by cellular tissue being entirely destroyed. The line of separation is not equally marked in every animal, neither is the figure of the corresponding surfaces the same as in man; in every instance, however, the cornea and sclerotic are distinct,
diffuse, though the union differs in its manner and degree. The cornea poffeffes a middle thickness between thoae of the anterior and posterior portions of the scleroticia; in this respect it is nearly uniform throughout, except at the edge, where it is thinned into the opening left in the scleroticia. Here its margin is accurately defined by a double groove, marking the union between it and the scleroticia. It is to this groove, distinguishable from the bordering part of the scleroticia by its dark colour, that the anterior edge of the circufary circle of the choroid coat firmly adheres.

The cornea is composed of an indeterminate number of concentric lamina, connected by a fine tissue, the cells of which are filled by a transparent fluid; to use the words of Zinn, " areolae aquae pelliculifiam fomn fort cite." The external layers are more easily elevated than the internal; they are often separated by diffusce, an effusion of pus or blood taking place between them, or lymph being deposited so as to destroy the transaparency of this membrane. The cornea has not, in its healthy state, any vesfeils carrying red blood, but is supplied by exuclants, which secrete the fluid of which we have been speaking. No nerve has been traced into its substance. The pelliced fluid contained in this membrane does not exude in the living state, but is constantly absorbed and renewed. After or a short time before death, it is suppoed to ooze out gradually, and form that obscure film before the cornea which destroys its transparency. This is not visible in subjects who die suddenly; but where the diffusce has been of longer continuance, the obscurity of the cornea begins sometimes before death, the fobs of brilliancy being often regarded as one of its forerunning symptoms. The aqueous humour does not pass through the cornea during life; after death it evidently does, the eye becoming flat and wrinkled; its tension may befoon restored by immersing it in water. Zinn believes that the obscure pellicle, observed on the cornea after death, conffits of the conjunctiva in an opaque flat, since it cannot be washed off, but may be removed by careful difsection with the knife. The cornea is not so elastic as the scleroticia, nor capable of undergoing equal extension; it will, however, recover its former dimensions, after being stretched, as is proved by an experiment of Mr. Hunter. It is sensitive to many of the senses when wounded, at least in its healthy state; it may when in a state of inflammation, and its vesfeils at such time carry red blood.

In the fetus it is rather more prominent than in the adult; and is descrihed as being thicker, the interfaces of the laminae being larger, and containing a greater quantity of fluid, fo as to diminish the capacity of the anterior chamber, and to approach, by its concave surface, nearer to the iris. It can be reduced to half this thickness by compreflion.

These obfervations have been made by Zinn and Petit: the deficiency of aqueous humour and this particular condition of the cornea was fuppoled by the latter to be one cause of the obfure vifion of infants. It does not lose its brilliancy after death fo great a degree as in the adult; which is attributed to its not allowing of tranfmutation with equal facility. For the fame reason it fearely decreases in volume under the fame circumstances. The cornea has been fometimes observed to be partly ophched in old age; the occurrence is, however, extremely rare.

The choroidies, or, perhaps more properly, the choroides (cercascontc) forms the second coat of the eye, lying immediately under the scleroticia. It extends from the exterior to the circumference of the optic nerve to the circumference of the cornea. The external surface is everywhere connected with the scleroticia by a fine cellular tissue, by numerous vesfules passing between these membranes, and by the ciliary nerves. This tissue is more abundant in the fexus than in the adult, and more particularly in the region of the nerves. It connects the two coats pretty closely, but is fo delicate as to allow of their being easily separated from each other by impelling air between the connection being preserved only by the vessels, which have a greater degree of firmness. It is more abundant near the cornea, and forms the basis of the ciliary circle. The internal surface of the choroid is in close and accurate contact with the retina at all points; but the two parts are not united by the medium of vesfeils, or cellular tissue. The posterior part of the choroid presents a small round hole, through which the medullary fibres of the optic nerve pass. It was long supposed that the choroid coat was continued at this spot fom the pia mater, or the thin membrane immediately enveloping the optic nerve. More accurate examination, however, has proved that they are not continuous membranes. As the choroid approaches the entrance of the optic nerve it adheres more firmly to the inner surface of the scleroticia by means of the numerous ciliary arteries, and the cellular tissue surrounding them. The pia mater of the optic nerve, after percuting with it the holes in the scleroticia, is reflected on all sides, forming a small ring, and loft on the inner surface of that taffce. At this part the choroid adheres to the pia mater very closely by cellular tissue, surrounding the rising medullary papilla, from which the retina has its origin, by a circular and well-defined margin. This is very evident by dividing the optic nerve longitudinally at its entrance into the eye. The choroid terminules in front by a wide aperture, near at the point of union between the cornea and scleroticia. Just before it ends we obferve it folded into the ciliary procies, and forming on the outer surface, by its altered structure and appearance, the orbiculus ciliaris, the anterior edge of which is intimately connected with the iris.

The choroid is very delicate, thin, and eafily torn. It is of a reddish brown colour on each surface. On the outside this colour is inherent in the structure of the membrane, and does not depend on the deposition of any colouring substance externally to its tissue. In the perfectly recent eye, the finger is fearely stained by wipping it, neither does it more than water, ififfered to remain in it for a few days. After that time the coloured tissue is softened, and parts with some of the colouring matter. On the internal surface of the choroid this colour is more decided, and depends evident on a dark kind of mucous secretion, called pigmenlum nigrum, included in a fine cellular tissue, increasing in quantity and intensity as we approach the anterior margin, where it takes a blackish tint. Towards the entrance of the optic nerve the pigmentation is much thinner, the structure of the choroid appearing through it. It seems to be a peculiar secretion from the vesfeils of the membrane, occupying both sides of the vafcular tissue, but more particularly its inner surface. It is described by Hunter as a "substance approaching to the nature and appearance of a membrane lining the choroid coat; and somewhat similar to the yel mocoum which lies under the cuticle of the human body; there is also some of the same kind of substance diffused through the cellular membrane, which unites the choroid with the sclerotic coat." When it has been washed away by mcration, the inner surface appears vilous. The colouring matter is not altered fearely by heat, nor by any chemical tefls of whatever nature to which it has been subjected; the colour is in some cafes deepened as to intensity, but never changed.

The choroid is formed by almost innumerable arterioli and venous vesfeils, united by a fine cellular tissue, into the form of a membrane. On examining it from without, after carefully
fully removing the sclerotics, we observe, first, the flat ciliary nerves, lying externally to the vessels, running forwards on the corneal surface. Besides these nerves we can generally see two vessels, rarely more, on each side; which having penetrated the sclerotics at its back part, run horizontally forwards, giving scarcely any branches to the choroid, and divide at the ciliary circle. They are the long ciliary arteries, and are frequently filled with blood. Under these arteries and nerves are numerous vessels, about the middle of the choroid, arranged in a particular form, and called on this account *vene verticin.' There are usually three venous trunks from which branches are thrown off on each side, forming irregular parallel arches, meeting each other in the intervals between the trunks. In a recent eye these vessels are filled with blood, and are very apparent. By immerging the choroid in alcohol, they become of a white colour, and are then still more readily distinguishable from the other vessels. The intervals between these veins are occupied by the ramifications of the short posterior ciliary arteries, appearing as dark-coloured threads lying under the arches. These arteries pierce the sclerotics near the entrance of the optic nerve; in the first instance they are on the external surface of the choroid; but as they advance they dip under the branches of the *vene verticin,' and approach the inner surface of the membrane. These numerous branches are given off at very acute angles, and are directed immediately forwards, forming an extremely fine net-work on the inner surface, so that the angular meshes are only visible when considerably magnified. The disposition of its vessels gave rise to an opinion that the choroid was composed of two layers, an external, formed by the veins, and an internal, by the arteries. The latter has been named tunica Ruyfchiana. This disposition is now completely rejected by the best anatomists, who agree in considering the choroid as a simple membrane. After long maceration it becomes almost transparent; and at this time the single-nets of its structure is sufficiently evident; when held between the eye and the light it appears as a net-work of vessels crossing in every direction, and not separable from each other. Parts of it have been frequently observed offlined.

At the distance of a line or more from the cornea, the external surface of the choroid begins to be enveloped in a grey, soft, short, pulpy tisse, of moderate thickness, representing a circular belt, to which different names have been attached. It is usually called the orbitus ciliaris, or ciliary circle; it is described also under the names of ligamentum ciliare and plexus ciliaris: Zimm calls it annulus collinolius; Soemmerring, from its structure made up "nervis ciliaribus, vasaque sua intermixta ligniferas," describes it under the term of annulus gangliformis. It is more than a line in breadth; its anterior part thicker and closer in structure than the posterior; it adheres with some little firmness to the sclerotics at the groove observed in the latter, close to its inner connection with the margin of the cornea. It may be easily separated by the finger, but is strong enough to resist the impulse of air driven between the choroid and sclerotic coats by the blow-pipe. Fontana has described a triangular canal as running along the circle of this spongy substance, intermediate to its connection with the slerotics. It has been noticed since by Soemmerring, and particularly by Murray, and is partly formed by the groove at the edges of the cornea and sclerotics. It is filled by an aqueous fluid. The ciliary circle is united more closely with the choroid, and can scarcely be separated from it without tearing the latter. It is always of a whiteness, or grey colour, very distinct, therefore, from the dark-coloured choroid; and not so broad as the ciliary procusses within. It receives in its substance the ciliary nerves and arteries in great abundance in their passage to the iris. The ciliary circle marks the line of division between the choroid and iris.

The iris is for a long time described as a direct continuation of the external layer of the choroid; and the ciliary procusses of the internal. The simplicity of this membrane has necessarily destroyed that opinion; and it appears that the iris is a distinct membrane, both in its structure and functions, separated from the choroid by the orbiculis ciliaris, in the anterior margin of the substance of which it seems partially encased, the outer edge of this circle projecting forwards beyond that of the iris, as may be seen after the cornea and sclerotics have been carefully removed.

The inner surface of the front of the choroid forms the ciliary procusses, which are thin plates disposed in the manner of radii round the chrynatline lens, and lodged in corresponding depressions of the vitreous humour. The ring made by the union of these plates, considered as a whole, is called the corpus ciliare. On making a perpendicular section of the eye from right to left behind the middle of the sphere, with an attention to disturb the connections of the several parts as little as possible, we observe, on looking into the anterior section, through the pellicled vitreous humour, a dark ring, resembling the disk of a radiated flower, surrounding the chrynatline lens. It is two lines in breadth, and rather narrower on the nasal side than on the temporal. It is terminated posteriorly by a ferrated, undulating, accurately defined and black margin. Near to the chrynatline lens, and prophets white streaks with black intervals placed alternately, so that apparently two rings are formed, the posterior and widest of an uniform dark colour, the exterior composed of white and black lines alternately. The white lines are the edges of the ciliary procusses, and the black interfaces the depressions between them covered by pigmentum nigrum.

When the membrane is removed from the vitreous humour, especially if the eye is not recent, a great portion of the pigment is left on the surface of the latter, giving an impression corresponding inversely to the opposite appearance of the procusses. In the eye of the new-born infant this is still more remarkably the case. In the recent eye of the adult this dark varnish remains deeply fixed on the substance of the intervals of the procusses, and requires much washing and maceration, in order completely to remove it.

After a careful ablation of the pigment it is very evident that the corpus ciliare is a direct continuation of the choroid. It is of a grey colour, lighter towards the iris from the white colour of the ciliary circle on its outer side. The corpus ciliare is concentric posteriorly with the slerotics; farther on it gradually quits it by the interposition of the ciliary circle, and turns towards the lens, corresponding more to the convexity of the vitreous humour than to the concavity of the slerotics. The projecting folds will now float freely from one side to the other, when immersed in water, being restrained by no transverse lateral connections. On a close examination of these parts we may observe the ciliary procusses rising from the inner surface of the choroid, about a line and a half from the iris, by two or more almost imperceptible lines "linea tenuissima," which soon unite to form a single fold, increasing in depth the nearer it approaches the chrynatline lens. The number of the ciliary procusses varies from sixty to eighty, but is generally neareat the former of these numbers and sometimes below it. They are alternately longer and shorter. Of the three edges formed by the triangular fold, the posterior is slightly denticulated, concave, and lodged in the opposite groove of the vitreous humour; the anterior, convex, is the base rising from the choroid, the internal, not
not a line in length, measures the space between the great circumference of the iris and that of the chrysfelline; it is evidently destitute of the three angles, the one corresponding to the chrysfelline is rounded, passing a little in part of the anterior part of the capsule, without, however, forming any connection with it. Zian, who appears to have investigated this point with his usual accuracy and minuteness of research, is decidedly of opinion that the ciliary processes are not adherent to the capsule of the lens; "non unia fibra, aut ullo vinculo capsula lentis adhereuntur." Halier believes that the ciliary processes support the chrysfelline lens in its situation, not by any immediate connection, but by the intervention of the vitreous humour, with which they certainly have a tolerably intimate connection. He agrees with Zian in not allowing them to be mucular. The angle corresponding to the great margin of the iris is joined to it, and to the round edge of the ciliary circle, by vessels and cellular tissue; at the line of union several freitall lines are being given off on the posterior surface of the iris to the edge of the pupil. The posterior angle is much elongated, and terminates in the fainter line we have mentioned on the inner surface of the choroid. The surface of the ciliary body, but more especially the intervals of the processes, is covered by a very dark mucus, much deeper in colour than that which lines the rear of the choroid; it is nearly black. The posterior edges of the processes not being covered by it, appear of a light grey. When the pigment has been washed off, the surface of the corpus ciliare appears villous, like that of the choroid behind; it is generally rugged. The structure is made up wholly of vessels united by fine tissue, as the rest of the choroid; we do not believe them to possess any mucularity, or any power of motion. The arteries come from the short ciliaries, which, after having run parallel to each other on the internal surface of that membrane, pass into each ciliary processes to the number of twenty at least. They run in a serpentine course along the fold, giving off numerous branches, which, by their multiplied divisions and frequent anastomosis, form an extremely fine network. When they have arrived at the floating edge they turn in one towards another, and anastomose, forming concentric arches. The veins of the ciliary processes join the venous vortices of the choroid.

The choroid in the fœtus, at the time of birth, is well formed: it may be detached easily from the teleretica and cornua, leaving on the fœt a reddish tint. Its outer surface is of the fame colour as in the adult: the pigmentum on the infus is black instead of brown; is less fluid, and more strongly fixed. After it has been removed, the choroid retains a feebly red colour, derived from its very vascular organization, and differing from that in the adult, under similar conditions. Towards the optic nerve, where the pigmentum is in smaller quantity, the reddish choroid is very apparent. The ciliary circle is not so fully masked as in the adult, and adheres but weakly to the scleritta. The ciliary processes are comparatively more developed, and are very distinct: they are of a reddish colour, but not so deep as the posterior part of the choroid.

The iris, (regenbogenhant, oder blending,) so called from the variety of colours on its anterior surface, is a plane membranous ring, floating in the aqueous humour, subtending the segment of the sphere, formed by the circumference of the cornea, and dividing the anterior from the posterior chamber of the eye. It is perforated by a circular opening, called the pupil, (lichtloeh, oder leheloeh, Sumn.) This aperture does not occupy the centre of the iris, but is rather nearer to the nasal than the temporal margin of its great circumference; hence the iris is broader, by about one-fifth, towards the temple than on the side next the nose. The diameter of the opening varies very considerably, according to the quantity of light directed on the retina. The anterior surface of the iris corresponds to the posterior concavity of the cornea, separated from it by a space called the anterior chamber, which contains by far the greatest portion of the aqueous humour. This surface is flat, and very different coloured in different individuals. It is brilliant, and we can distinguish in it an external wider circle of a light r, and an internal narrower ring of a darker, often of a different tint. On this surface also we see a number of flrize, more or less serpentine, or parallel, large or small, converging towards the lesser circle, on which the flize are not so numerous, or so conspicuous. The distinction between them depends more on their colour than on any elevation above the surface; and they are more serpentine in proportion as the pupil is dilated, and the iris contracted. The posterior surface of the iris is opposite to the anterior convexity of the chrysfelline, separated from it by a narrow space, the posterior chamber of the eye, filled by the lesser part of the aqueous humour. It is covered by a thick, dark coloured mucus, nearly black. Here also, when the colouring matter has been washed off, we observe any direct lines converging to the centre of the pupil, but very distinct from those on the anterior surface. This surface was formerly known by the name of uvea. The great circumference of the iris is let into the thicknefs of the anterior edge of the ciliary circle, at the line where the cornea terminates internally. It may be separated without any laceration by the finger, or more easily still by maceration in water.

Although the appearance of the two faces of the iris is very different, we cannot in the human subject make any divisions of it into two layers, though this is the case more or less in other animals. It appears as a simple membrane, made up of vessels, nerves, and membranous fibres. When examined with the assistance of a magnifying power, the two circles on the anterior surface of the iris appear composed of numerous fibres, converging from the circumference of the iris towards the pupil, and distinguished from each other chiefly by their colour. The longer ones are generally white; the shorter are finer, and of a darker colour. They are tortuous when the pupil is dilated, and nearly straight when it is contracted. When they arrive at the circumference of the lesser circle, the larger of these fibres divide into two branches, forming acute angles, and diverging towards similar branches with which they unite, to form an undulating or destituted circular line, dividing the greater annulus from the smaller. From this margin there depart several delicate fibres, similar in their course to the larger flrize, which converge as radii towards the pupil, and form the lesser ring of the iris, by which that opening is immediately surrounded. Halier, who minutely describes the appearance of the iris under the magnifying power, agrees in the principal features of his account with the one here given. He says that several of the radiated flrize are collected into flocelli, and that these united make a serrated arch, convex towards the pupil, at the margin of the lesser circle, the flocelli being "varie in flamulas quadam introrum estes dispositi." This radiated structure is covered by a fine transparent membrane, of which we shall speak below, as including the aqueous humour. When the pigment has been washed from the back of the iris, this surface appears of a whitish colour, and presents a great number of slanting straight lines, converging from the circumference to the pupil, appearing almost as continuations of the
the ciliary processes. These lines, totally different from the radiated and serpentine fibre on the anterior surface, become more prominent, forming a kind of plait when the iris is extended, so as to augment its breadth. As they approach the pupil, they are gradually effaced, but with a highly magnifying power may be traced to the opening of the pupil. No circular fibres are in any case visible. The regular disposition here described is not visible to the naked eye; we can observe irregular lines converging towards the pupil in the living subject, but cannot by any means discern their exact disposition. After death they are still less apparent.

The long ciliary arteries are the chief source from which the iris derives its supply of blood. These vessels, in number, one on the nasal, the other on the temporal side of the eye, run between the choroid and sclerotic coats, till they arrive at the ciliary circle. Here they divide usual into two principal branches, going off at very obtuse angles, which advance to the circumference of the iris, where the two branches of one artery anastomose with those of the opposite, so as to form an arterial circle, corresponding nearly to this circumference. From this arterial ring, augmented by the accession of the anterior ciliary arteries, are produced a great number of small branches, more or less parallel, or tortuous, directed towards the pupil, and anastomosing freely by lateral communications. On arriving at the lefser ring of the iris, many of these bifurcate; their branches anastomose, and produce another vascular circle, corresponding to the circumference of the lefser ring of this membrane from which other radiated vessels go to the margin of the pupil. This circle, however, is by no means so regular as that round the circumference of the iris; and many branches from the latter pass on, without joining it to the lefser ring, and to the pupil. With these arterial ramifications many veins are intermixed, which join, some the veins vorticose, others the veins accompanying the long, and the anterior ciliary arteries. The ciliary nerves, which we have before described as entering the ciliary circle, divide in that part into numerous fine threads, running towards the anterior surface of the iris, into which we can trace them but a very short way; they soon become confounded with the fibres before mentioned, as to escape all reference, even by the aid of the microscope.

The iris then appears as a membrane composed principally of arterial and venous branches and nerves, connected by nervous tissue. The fibres arise probably from the disposition of the latter of these parts, and totally differ from those of a muscular kind both in structure and functions. A supposed necessity of assuming their muscularity, in order to account for the motion of the iris, has alone given rise to that opinion, which is now rejected by the most eminent physiologists. Numerous membranous fasciculi are described by Zinn on the anterior surface of the iris, plainly distinct from the vessels; they in some measure float in the aqueous humour in the intervals of the radiated fibres before described, producing, in conjunction with these two, innumerable frictions of the luminous rays.

The various colours of the iris in the fave, and in different individuals, essentially depend on the pigment which covers the posterior surface of the iris, which gives the prevailing shade of the tint. For if this is removed, the iris is nearly transparent. The exact nature or immediate cause of these colours is unknown. Sommerring observes, that the lighter the colour of the pigment and of the iris, the more delicate are the coats of the eye, and the converse holds equally good; the darker the eye, the fewer are the ciliary pleats. The colour of the pigment corresponds in some degree with that of the hair and skin. In the human subject it is most commonly dark. In many classes of animals, there is a difference of colour in the fave eye; in the cow, or sheep, for instance, there are, in the same eye, certain portions of a yellow white, and others of a fine green colour, the remainder being black. In the human species we see different shades from nearly black to nearly white; and we find these to correspond in a striking manner with the colour of the skin and hair, if we trace it from the black iris, and skin of the African negro, through the different races of men, to the fair skin and light eyes of the northern European. We sometimes meet with persons whose skin and hair are very white, and yet the iris is dark, which is a sign of a dark pigment; but if we examine more carefully, we shall also find that the eye-lashes are dark. The iris of one eye is often lighter in colour than that of the other, and sometimes only one-half of the iris is white. Whether this difference in the same individual is owing to the pigment being different in colour, is not, we believe, ascertained. The iris is totally white in the wall-eyed horse. In the Albino, of whatever race, the iris is somewhat white, but almost pellucid, slightly tinged of a colour between a pale violet and red. The pupil is of a full pink, or rather red. These phenomena are caused by the deficiency of the pigment, the tinge arising from the numerous blood-vesels of the iris and choroidal coat; and correspond with the total want of colouring matter in the rete mucosum. For other peculiarities in the eye of the Albino, or Leucæthiops, we refer the reader to the description of the first plate illustrating the anatomy of the eye. In all cases the colours of the iris, the "Rupendae colorum variates" are very much clearer than seen through the medium of the aqueous humour, which evidently augments their intensity; when the cornea is removed, and the aqueous humour disillusioned, they lose much of their brilliancy.

The iris possesses but little sensibility in its healthy state; its motions are involuntary, and depend not on any direct excitation, but on the quantity of light falling on the retina; rays of light, so directed as to fall only on the iris, have no visible effect in altering its figure. It changes most plainly and rapidly when the eye is brought suddenly near to the pupil of the candle, or removed from a light to a darker place. In the first case the breadth of the iris is increased, and the pupil proportionally contracted; in the second the converse may be observed. This alteration in the diameter of the pupil is connected in some degree also with the closeness or distance of the object. The iris, in all its motions, appears to possess a peculiar mode of action, observed in no other animal tissue. Its dilatation diminishes the pupil, and its contraction widens that opening. Here then the presence of the stimulus produces an elongation of its parts, and its absence its contraction, the inference of what happens in muscular action. That the iris acts sympathetically only, is further proved by its loss of motion in paralytic affections of the retina, as in glaucoma, the pupil being in these cases widely dilated. This affords another argument to shew that the contracted state of the iris is the state of rest, and that this part moves only in consequence of the action of light on the retina. Further, its motion ceases at the moment of death, and cannot, like that of muscular fibres, be renewed by the application of stimuli. The very different diameters of the pupil in the dead subject depend on the state of the iris at the instant of dilatation, and constitutes a further argument against its muscularity. The motion of the iris has been described to the sudden turgor or depletion of its vessels; the former condition increasing its breadth by making the fermin
by the difference of its colour. From this circle the retina spreads under the choroid as far as the commencement of the corpus ciliare. It has no connection with the choroid, being simply in contact with it, and receiving no tinge from the pigmentum. The concave surface of the retina embraces closely the vitreous humour, but has apparently no further union with it than what is derived from the passage of the central artery into that body. The anterior margin of the retina corresponds to the great circumference of the corpus ciliare, the choroid beyond this line being in immediate contact with the vitreous humour. The termination of the retina at this line has been doubted by many anatomists, who maintain that it is continued over the vitreous humour to the edge of the chrysaline. They affirm that a very delicate layer is continued from its apparent termination between the ciliary processes and vitreous humour, to the edge of the chrysaline. In order to see this part the choroid must be carefully removed, and the eye immersed in water, when the prolongation of the retina becomes evident. That a delicate membrane really adheres to the anterior part of the vitreous humour would thus from clear, but whether it is a continuation of the retina admits of doubt. If the examination be made in a recent eye, the latter membrane terminates most decidedly at the edge of the ciliary processes. Inspection of the eye in spirits gives to the vitreous body an opaque and pallid surface, which may be mistaken for a continuation of the retina. But the retina easily separates from this apparent prolongation, and appears to end by a regular, acute, and well-defined margin, very different from what we should expect if the membrane had been lacera ted. We believe its termination to be at the great circumference of the corpus ciliare, and consequently more than a line from the circumference of the chrysaline lens.

In all other animals that have a corpus ciliare the retina terminates as we have described. In birds it forms a projecting roll at this part. In animals which have no ciliary processes the retina ends suddenly towards the commencement of the iris, and it is manifest that the anterior surface of the vitreous body retains no portion of it. It further appears that an instrument plunged into the eye, in this subject, behind the ciliary processes, occasions acute pain, which is not the case if the wound be made anterior to their commencement. And we have no example in the animal body where the medullary part of a nerve is continued into a membrane of no sensibility, whose only use could be that of supporting the soft parts within it.

The retina in the living subject is most perfectly transparent; it becomes of a pale white soon after death. It possesses some thickness, but is so soft as to be torn with slight force. It is formed chiefly by a medullary substance continued from the optic nerve. When examined attentively as it lies spread over the vitreous humour, we observe in it many transparent lines, distributed without any regular order, united by other transverse lines, between which opaque areas are visible. These lines are probably the ramifications of vessels of the retina. For in addition to the medullary pulp, of which the retina is composed, this membrane presents a vascular and filamentous network, occupying its inner surface, made up by the central vessels, and a very fine tis sue supporting them. On this network the medullary part reds, so that the retina may be almost described as being composed of two layers. It is, however, impossible to separate them throughout, even by maceration. On the outer, or temporal side of the membrane, about two lines distant from the entrance of the optic nerve, and in the very axis of the eye, we observe in the
recent organ a yellow spot, of a deeper colour towards its centre, and of about a line in breadth. It is generally concealed by a fold of the membrane, for which reason it escaped for a long time the researches of anatomists, Soemmerring having been the first who observed and described it. The centre of this yellow spot is perforated by a small hole. These facts are best seen by detach ing the posterior part of the sclerotic and choroid coats under water; the eye should be as recent as possible. "In the retina central inciditilla tum cornutum foraminulum plane rotundum cum limbo latero, quod duo vorum sanguinis ferorum rami eleganti corona cingunt." The folds surrounding it are thus prevented, and the membrane continuing tender, these appearances are sufficiently evident. They may also be advantageously seen through the transparent vitreous humour in a simple section of a recent eye. In this way, however, it is difficult to prevent the retina from falling into folds. Another method of demonstrating it is, by removing the cornea, iris, and chrysalid. The retina then remains undisturbed, and the foramen, with its yellow zone, is plainly visible in a strong light. Mr. Home says, that it is apparently a little below the posterior end of the visual radius. He observes also, that in separating the vitreous humour from the retina, there is a greater adhesion at this particular part. This spot is pale in children, bright yellow in young persons, and again pale in old age. It has been observed that the intensity of the colour is connected with the flow of vision; that it diminishes where that is obstructed, and that the yellow spot entirely disappears when vision is lost. The plait which has been described as extending from this spot to the optic nerve we believe to be only accidental, and caused by the adhesion of the vitreous humour, when the latter has been somewhat displaced in the examination.

The foramen centralis, first discovered by Soemmerring in the human eye, has been since demonstrated in the eyes of several quadrupod, where these organs are directed forwards, and have their axes parallel to each other.

The central artery gives its principal branches to the retina; a small trunk only enters the substance of the vitreous body. We frequently find the larger of these branches filled with blood, and two of them surrounding the central foramen "infor corone." The central vessels exhibit a very elegant appearance, when seen through the transparent lens and vitreous humour, on the surface of the retina. The central artery varies much in its origin, being derived sometimes from the trunk of the ophthalmic, others from the internal long ciliary, or the inferior muscular. There are sometimes more than one arterial trunk, but the principal always runs on the axis of the optic nerve, and enters with it as before described. The central vein usually corresponds to the artery in its origin and course.

The retina is very completely formed in the full grown fetus. Its vessels are particularly numerous and apparent. The yellow spot is not visible in the fetus of nine or eight months; nor can it be observed at all times even in the eye of the new-born infant.

The humours of the eye.—The humours of the eye are three in number; viz. the vitreous, the chrysalid, and the aqueous, each possessing a delicate transparent membranous investment peculiar to itself. The vitreous body (glaskörper) so named from its resemblance to glass, is composed by the vitreous humour, properly so called, and the membrana hyaloidea, which contains it. It is a soft transparent mass, extending from the back of the eye to the chrysalid lens, occupying rather more than three-fourths of the globe, and possessing a spherical figure, with a depression in the middle of its anterior surface, in which a part of the chrysalid is lodged. Its surface is covered in the greatest part of its extent by the retina, with which it is connected only at its posterior part, as before related. Beyond the termination of the retina it is covered by the ciliary body, and is marked by radiated grooves, into which the ciliary processes are received. It is perfectly pellucid, softening, at first sight, no distinction of membrane, or humour. The membrana hyaloidea contains the vitreous humour, forming its external capsule. Numerous plates of membrane pafs from its inner surface, interfacing each other, and thereby forming small cells of different figure and size, in which the humour is immediately held. Towards the commencement of the corpus ciliare this membrane divides into two layers, the internal of which, continuing to cover the vitreous humour, passes behind the chrysalid, whiff the external goes on under the corpus ciliare to the circumference of the chrysalid, attaching itself to the anterior part of the capsule, in which the lens is contained. This layer is described by Zinn under the name of the "membrana, or zonula cornei ciliari;" which latter term denotes the radiated circle on the front of the vitreous humour, marked by the pigment of the ciliary processes. This membrane has probably been mistaken for a continuation of the retina. Zinn does not believe it to be a continuation of the outer layer of the hyaloidea, which he afferts to be throughout a simple membrane. Between it and the membrane immediately involving the vitreous humour there is formed a triangular, curvilinear cavity, the base of the triangle being formed by the capsule of the chrysalid. This canal is named from its first discoverer, F. Petit; it was called by him "le canal gordoni;" from its peculiar appearance. It is covered externally by the black radiated stria of the ciliary processes, and here it corresponds to those processes. Hence we notice in it radiated fibres, equal in number to the ciliary processes, and in contact with their posterior edge. These fibres are not so long as the looser membrane between, which corresponds to the hollows between the ciliary processes. They bind it down consequently from space to space, so that when air is impelled into it, we see this canal greatly elevated and depressed. Being equal in breadth to the corpus ciliare, it must be rather broader on the temporal than on the nasal side. It has no communication with the cavity of the chrysalid capsule. Little is known concerning the intimate structure of the membrana hyaloidea. It receives a few vessels from the central vessels of the retina, and secretes, no doubt, the vitreous humour. It is capable of undergoing a certain degree of extension without rupture. Boiling water, or concentrated acids, act but feebly on it, producing only a slight contraction.

The humour may be obtained, from its containing membrane and cells, by pressure, or by making incisions into, and suspending the vitreous body: when thus procured, its quantity is proportionate to the volume of the eye. Its weight, as ascertained by Petit, was 103 grains in an eyeball which weighed 142 grains. It is somewhat viscous, and perfectly limpid. The specific gravity, as determined by Chenevix, is 1.053. It is composed of water, albumen, gelatine, and mucrate of soda; and is easily miscible with water, which, even when boiling, produces only a slight opacity.

The arteria centralis leads to the vitreous body a branch called the central artery of the vitreous humour; this passes from behind forwards to the back of the chrysalid capsule, on which it is distributed in a beautifully arborecent form.
form. A few very fine branches from this vessel are spread over the membrana hyaloidea.

The structure of the vitreous body may be most advantageously examined in the section of a frozen eye. We then observe numerous icy flakes, separated by membranous septa of the most delicate appearance. These flakes are of different lengths and breadths; they reflect on the whole, wedges with the base backwards, and the summit forwards; the convex part next the circumference of the vitreous body, and the thinnest directed towards the chryalline; in other words, they appear as segments of a circle, the centre of which would be in the lens. This structure may be exhibited by means of acids, which render the membrane somewhat opaque; and still better by immersing the vitreous body in a solution of potash, which acts only on the membrane, and gives no degree of turbidity to the contained fluid. The cellular septa may be blown by allowing the fluid to escape through a simple incision, and afterwards impelling air through the same opening.

The chyrralline humour—so called from its transparency, is a lenticular body, situated on the anterior surface of the vitreous humour, which is hollowed to receive it, and enclosed in a peculiar membrane, called its capsule. The chryalline is placed at the distance of about four-fifths from the posterior end of the axis of the eye; but, as its axis is the same with that of the pupil, and the iris is one-fifth broader on the temporal than on the nasal side, the centre of the chryalline is rather on the inner side of the axis of the eye, though in the same horizontal plane with it. Its anterior surface is opposite to the back of the iris, from which it is separated by a space called the posterior chamber of the eye, and containing a part of the aqueous humour. The circumference corresponds to the canal of Petit, and to the ciliary processes, which project a little over its anterior surface into the aqueous humour. The two surfaces of the chryalline are not of equal convexities, the posterior being the most prominent. According to the experiments of Petit, the anterior convexity represents a segment of a sphere, whose diameter would vary from six to nine lines; and the posterior, of a sphere, the diameter of which would be somewhere between four lines and a half and five and a half. These forms of its superficies, however, are by no means constant, the difference of convexity being in some instances scarcely discernible. The chryalline varies much in figure, transparency, and constancy, according to the age of the subject. It is firmer in old people, and very frequently acquires a yellow tinge. In the healthy adult the chryalline is perfectly transparent, not of equal constancy throughout, but gradually increasing in density to its centre. The exterior parts are thick and glutinous, and may be rubbed off by the fingers. Those more deeply seated are solid, and appear, after immersion in weak acids or alcohol, dispofed in the form of numerous concentric laminae, harder as we approach the centre. Each of these laminae is composed of extremely fine parallel fibres lying in a direction from the circumference to the centre. When exposed to air after a short maceration or immersion in alcohol, it further breaks into irregular triangular segments, converging by their points to the centre of the lens, which again subdivides into smaller portions. When immersed in boiling water the soft external parts acquire a milky white colour, and a firmer consistence. In this state it may be easily removed, leaving a nucleus much more solid, of a pearl colour, shining faintly, and not undergoing any further alterations by repeated immersions. Alcohol produces similar effects, but not in so sensible a manner. Long continued maceration changes the chryalline into a pulpy mass. Exposure to the air renders it dry, solid, and friable on the surface, the primitive form, and even transparency, being still preserved; in this state it may be kept for a long period. Sections of the dried lens exhibit its laminated structure. Examined chemically, the chryalline is found to consist of albumen and gelatine, with a very small quantity of water, and has not either any thing acid or alkaline in its composition.

It receives no red blood-vessels; we can trace no nerves even to its capsule; nor does it possess any animal sensibility. Anatomists have even doubted whether this body possesses any vital properties. Leeuwenhoek has described the fibres of the chryalline, and indeed sometimes calls it a muscle. Little can be drawn from such examination, when we consider the cheel power of his microscope, and the probably dry state of the chryallines he examined. Dr. Young has given an apparently accurate description of numerous fibres, with interjecting tendons, in the chryalline of an ox. These he believed to be muscular, and to possess a power of increasing the sphericity of the part. This opinion he afterwards changed, as we shall notice hereafter. The late Mr. Hunter conceived, that the chryalline could change its figure. He observed the remarkable fibrous lamina which surround the more solid parts in the cuticle, and concluded the structure to be analogous in other animals, where conglutination develops the fibrous structure. We are disposed to admit of a change of figure in the lens, but the arguments for its muscularity are not convincing. Though it may be separated into spherical lamina after death, we cannot infer that the pulpy, coarser, subcutaneous lens in the living eye is composed of fibres and lamelle divided by regular segments. The reagents above mentioned totally alter its nature, rendering it opaque, and partially friable. The appearance of fibres is equally strong in the conglutinated part of the blood, when immersed in the same menstrua. But if we admit the radiated fibres of the several artificial lamina, the transparent nature and refractive powers of the lens are hardly reconcilable with the idea of muscular action. The lens, in experiments made instantly after death, is not acted on by those stimuli which so evidently affect muscles under similar circumstances. No change of figure, no action of its component parts, can be seen on the application of electricity. In short, if we consider the peculiar appearance of the recent lens, its perfect transparency in a healthy state, and its peculiar dilates; the want of colour, the turgor, of red blood-vessels, and nerves; the deficiency of sensibility and contractibility, animal, or organic, indeed, of all properties possessed by the common muscular fibre, we must conclude that no sufficient proofs of muscularity exist. A supposed necessity for the presence of muscular fibres, in order to account for certain supposed changes in the figure of the lens subservient to the accommodation of the eye to different distances, has given rise to an opinion, hitherto unwarranted by anatomical investigation.

The chryalline is contained in a transparent membranuous capsule, composed of two portions; one of these is derived from the hyaloidea, infected into the capsule on its anterior surface, beyond its greatest circumference, and already described under the name of membrana cornea ciliaria. This is probably continued over the whole anterior surface, but cannot be demonstrated so extensively; towards this circumference it is manifest by a transverse section of the canal of Petit. The hyaloidea is in close union with the posterior part of the proper capsule, but may be separated from it. The proper capsule, thus maintained in its situation, forms a complete bag, between which and the surface of the lens
we find a small quantity of transparent aqueous fluid, more abundant on the anterior side, and elapsing infallibly when the capsule is wounded, (aquula Morgagni.) Its quantity is very small in the recent eye. Haller believes it to be produced by transudation from the lens; probably it is secreted by the capsule, and prevents the adhesion of the opposed surfaces. The anterior part of the capsule is more elastic than the posterior. The latter, as it can be separated from the hyaloida, is thinner and softer, but still thicker than that membrane. It contracts and becomes opaque by immersion in boiling water; similar effects, but in a less degree, are produced by acids; it is not altered by alkalies; it becomes yellow by remaining in the air. The texture of the capsule is but little known. It is supplied by vessels from the central artery, which penetrates the vitreous humour. After a minute injection in the fetectus, a small trunk can be perceived coming from this artery, giving off numerous radiating branches on the posterior surface of the capsule. Some of these have been even traced into the substance of the lens; but no such vessels can be seen in the adult. Vessels have been traced also crossing from the choroid processies to the circumference of the capsule. Some of these may be continued to the lens itself; but, if they exist at all, they must be extremely minute.

The aqueous humour is a limpid transparent fluid, occupying the curvilinear space between the chrysalidine, the front of the corpus ciliare, and the cornea. This cavity is divided by the iris into two unequal parts, communicating with each other by the opening of the pupil. The larger portion being between the iris and the cornea, the smaller between the iris and the lens; the first is called the anterior, and the half the posterior chamber of the eye. Much pains have been taken, by freezing the eye, to ascertain the relative dimensions of these. The aqueous humour weighs generally between four and five grains; the exact quantity in each chamber, and the dimensions of these cavities, have been most carefully ascertained by Petit; and the results of his investigations are contained in the Mémoires de l'Académie des Sciences. The very existence of a posterior chamber has been doubted; but the most accurate researches shew that there is always a space between the front of the lens and the posterior surface of the iris, occupied by aqueous humour.

The aqueous humour resembles the fluid contained in the cells of the membrane hyaloida in its composition; it has the same specific gravity, and the same proportions of albumen, gelatine, and water, and murrate of soda, according to the observations of Mr. Chenevix. It offers the same phenomena when exposed to the action of similar chemical agents. This humour is probably contained in a fine capsule, somewhat similar to those belonging to the other humours. We can observe at least an extremely fine membrane lining the posterior surface of the cornea, reflected from its circumference to the anterior surface of the iris, and advancing over that membrane towards the opening of the pupil; to the aperture of which it cannot however be traced. This membrane may possibly be continued through the pupil, and line the posterior chamber. We suppose it to secrete the aqueous humour. This may be furnished perhaps by the arteries of the iris, or ciliary processies. It is very rapidly renewed after wounds in the cornea.

Muscles of the globe.—The globe of the eye is situated towards the front of the orbit, supported by a cushion of soft and yielding fat, and receiving the innervation of various muscles, which execute its rapid and varied motions. These arise from the bony orbit; five coming from the posterior part, at the apex of the cone, and one near the front edge. They follow different directions towards opposite parts of the eye-ball; and are named from their direction, or apparent action, the four straight, and two oblique muscles; or the elevator, depressor, adductor, adductork, great and small rotators of the eye. The four recti are closely connected at their posterior attachment, so as to form part of the fides of a hollow cone, of which the base is the bulb of the eye, and the form nearly the same as that of the orbit. In this space are contained, besides fat, the ciliary arteries, the ciliary nerves, and lenticular gum, and the large optic nerve. These four muscles, arising by small tendinous ends, become pretently feathery and of increased size, which diminishes as they arrive at the middle of the bulb, the muscles terminating in flat tendons. In the latter part of their course they are closely invested by a cellular sheath, which connects them with the anterior pole of the orbit, and is continued on each side, connecting the tendons in some measure, and passing forwards between the selerotica and conjunctiva. The tendons of the recti proceed beyond the middle of the bulb, which is slightly hollowed externally for their reception, and are attached, at about equal distances from the cornea, on four opposite fides. These tendons are no where in contact with each other, not even at their termination, which is their broadest part; and are so closely united with the selerotica, as not to be separated from it without manifest laceration. Mr. Home, and Mr. Pierce Smith affirm, in the Philosophical Transactions, that the tendons not only pass to the anterior part of the selerotica, but are continued in one united sheet over the cornea. This very ancient opinion, produced as a new and important discovery, has long since been overturned by the most eminent anatomists, and scarcely requires discussion here. Neither would the representation, if well founded, assist us in explaining the phenomena of vision, or the motions of the eye. The tendons are united very considerably beyond the transeptal vertical diameter of the globe, gaining thereby an extent of power, which they could not possess if attached behind that line. The construction is plainly subordinant to the motions of the globe; any further use is perhaps problematical.

The rectus superior, attollens of Albinus, is attached posteriorly, between the levator palpebræ superioris and the foramen opticum, by short tendinous fibres; it passes nearly horizontally, above the optic nerve, and, turning over the bulb, is attached to the anterior part of the selerotica, about 4th of an inch from the edge of the cornea. It covers, anteriorly, the globe of the eye and the tendon of the superior oblique; posteriorly, the optic nerve, the ophthalmic artery, and the nasal branch of the ophthalmic nerve. Above it, lies the levator palpebræ superioris.

The rectus inferior, depressor of Albinus, resembles the preceding in form, but is smaller in bulk, situated on the lower part of the orbit. It is attached behind by a tendon common to it with the abducæuctor and adducætor; a tendon fixed to the sphenoidal bone near the sella turcica, and passing through the foramen lacerum orbitales; it divides into three portions, one for each of these muscles. The rectus inferior passes horizontally forwards, and is united to the selerotica opposite to the insertion of the rectus superior. It corresponds below to the floor of the orbit; above it are the optic nerve at some distance, and in the interval the nerve of the third pair.

The rectus externus, adducætor, Alb. has a greater length of muscular belly than any of the four, which it otherwise much resembles. It has two attachments posteriorly; one to the tendon before mentioned, the other, contiguous to
that of the rectus superior, is derived from a ligamentous band crossing obliquely the upper part of the foramen lance-ram. Between these attachments a fissure is left for the passage of the nerve of the third pair, of the fifth pair, and of the nasal branch of the ophthalmic. The muscle itself proceeds obliquely to the outer side of the globe, and is united to the anterior part of the sclerotic, at about the same distance from the cornea as the two preceding muscles. On its outer side are the surface of the orbit, and the lachrymal gland; on the inner the optic nerve, the nerve of the fifth pair, and the ophthalmic ganglion.

The rectus internus, adductor, Alb. lies on the inner side of the orbit. It is attached behind to the common tendon, and to the inner side of the foramen opticum, as far as the origin of the rectus superior. It passes, in a straight course, to the inner side of the globe, and terminates in a manner analogous to the rectus. It is the shortest, and the thickest of the four recti muscles; the former circumstance arising from the relative form and position of the orbit and the eyeball.

Of the two oblique muscles, one arises from the bottom of the orbit as the recti, the other from its anterior, and internal part. The first of these, the obliquus superior, or trochlearis, is attached posteriorly to the internal and upper part of the orbit, about two lines from the foramen opticum, by short tendinous fibres. The muscular portion is small and somewhat rounded, and passes towards the internal angular processes, where it terminates in a delicate tendon, which passes through a cartilaginous pulley fixed to the upper side of the orbit. This pulley is formed by a cartilaginous plate, with its edges turned upwards and attached to the orbit, so as to form a complete tube, situated obliquely, of about a quarter of an inch in length. The pulley is bound to the orbit by ligamentous fibres at both its ends, and especially in front. Soemmerring has described a "ligamentum lunatum ex arcuatis fibris tendineis splendens-tibus compositum," a passage between the edge of the orbit and the pulley, and preventing it from being drawn backwards in the actions of the muscles of the eye. This canal is lined by a synovial membrane, which continues to invest the tendon of the obliquus superior, after it leaves the trochlea to its insertion in the globe. The tendon is reflected at an acute angle, and descending a little backwards and upwards, passes under the rectus superior, and terminates below it on the outer, posterior, and upper surface of the sclerotic, about half way between the optic nerve and the edge of the cornea. It corresponds, in the first part of its course, to the orbit within, the optic nerve without, the rectus superior above, and rectus internus below; in the second its tendon lies between the conjunctiva, the rectus superior, and the eye-ball.

The obliquus inferior is fixed by a small tendon to the interior edge of the orbit, rather below and on the outer side of the opening of the ductus nasalis. It passes obliquely backwards and upwards, between the rectus inferior and the orbit, and turning upwards, between the globe and the rectus externus, is attached by a tendinous expansion to the sclerotic at the superior part of its outer side, behind the insertion of the obliquus superior.

The immediate actions of the recti muscles are simply those of directing the axis of the eye towards different points. According to their attachments they will elevate or depress the pupil, turn it towards the nose or the temple. By the differently combined actions of these muscles, the eye may be moved in any of the intermediate angles. By the succession of such actions it may be moved rapidly round in the orbit. In all these cases the action of one muscle is moderated by its opposite. The motions of rotation inwards and outwards, motions in which the eye does not move from its place, but only on its axis, are executed, the first by the superior, the last by the inferior oblique. By the united action of the fix we are enabled to preserve the eye in the same relative position with regard to the object, whether it be at motion, or at rest; and whether the head is fixed or moving in any direction, so as to alter its position with respect to the object; in short we can by their means direct the eye to any point, and keep it fixed there under any change of the situation of either. To use the expressive words of Mr. Hunter, "the object becomes as it were the centre of motion or fixed point, commanding the direction of the actions of the eye, as the north demands the direction of the needle, let the box in which it is placed be moved in what direction it may." From the two eyes being always thrown on the same objects, and the will not being able to change the direction of one of them only, for instance to keep them fixed when the head is elevated, they are always seen to correspond in their motions into action. "Thus, in the two eyes by the opposite muscles. If the eyes are directed to the right for example, it will be instantly seen that the rectus internus of the left eye, and the rectus externus of the right will be principally employed. The will extends only to the moving both the eyes at the same instant; we have no power over either separately.

The oblique muscles move the eye from object to object, and keep its point of vision fixed upon any particular one, be it moving or at rest, while the head remains a fixed point, while it moves progressively with the eyes in following a moving object, and even in some cases where the head and the object are moving in opposite directions. They produce the circular movement when the head is at rest; and when the eye is to become fixed, the head performs the circular movement. By these means the eye, the axis of the eye, and the point of sensation, are all preserved in the same straight line. But there are some movements of the whole head, of which the eye is a part in which the oblique muscles alone are not sufficient to effect this, and where the oblique muscles are especially called into action. "Thus, when we look at an object, and at the same time move our head to either shoulder, it is moving in the arch of a circle, whose centre is the neck. When the head is moved towards the right shoulder, the oblique superior muscle of the right side acts, and keeps the right eye fixed on the object; and a similar effect is produced on the left eye by the action of its inferior oblique muscle: when the head moves in a contrary direction, the other oblique muscles produce the same effect. As this motion of the head seldom takes place uncombined with its other motions, some of the oblique and oblique muscles will be employed at the same time, according as the motions are more or less compounded."

It has not been clearly determined whether these muscles can alter the figure of the eye, nor in what direction the change would be produced, although considerable labour and ingenuity have been bestowed on the subject. Mr. Home advances, that an increased curvature of the cornea, an elongation of the axis of vision, and a motion of the crystalline lens; all which changes he supposes to have taken place in the adjustment of the eye to view objects at different distances, depend in great measure on the contraction of the four straight muscles. Compression of the eye will force the aqueous humour against the centre of the cornea, while the globe is at the same time fleeced, so that the radius of the curvature of the cornea will be rendered shorter, and its distance from the retina increased. When the recent eye of an adult was distended by air being blown
blown through an opening made in the optic nerve, the axis of vision was elongated from 17-20ths of an inch to 17½. Mr. Home supposes that in this case pressure is made in the most unfavourable way for producing the greatest elongation in the axis of vision, and that a lateral pressure from without would be more effectual; this pressure he believes to be made by the recti-muscles. That the eye-ball does not recede in the orbit, under these circumstances, he concludes to be sufficiently proved by its not having done so in his numerous experiments. It is not demonstrated, however, that any action of the recti, or at least any powerful action, took place in any of these experiments. Dr. Hofack, who believes in the elongation of the axis by muscular action, supposes the muscle to make the comparison, and will oblique muscles to keep the eye in its proper direction and situation. To us it is yet problematical, whether any change is produced in the axis of the eye by the action of its muscles. How far such changes could contribute to the adjustment of the eye to distances, will be more properly considered hereafter.

The great mobility of the eye has rendered this organ well suited to express many of our wants, to assist, in some degree, our gullures, or our voice, and to supply their place when their action fails. The part performed by the eye, in expressing the different passions, the spirit which it gives to the other features, are interesting subjects, on which our limits will not allow us to enlarge.

The course of the optic nerve in the orbit, and its termination in the retina, are described in our account of that membrane. The other nerves of the orbit will be described under the article Nerve. Some particulars concerning them will be found in the explanation of the plates representing the anatomy of the eye. The arteries are derived principally from the ophthalmic vessels of which a description will be found under the article Artery. The veins of the globe of the eye join the vena ophthalmica cerebrals, which opens into the cavernous sinus. The veins of the choroid and iris, as named by Walter, are an inferior, short, and an anterior long ciliary joining the infra-orbital vein; an internal ciliary, a superior ciliary, a posterior and some long ciliary veins, joining the trunk of the ophthalmic. These veins return the blood carried to the eye by the ciliary arteries. They arise by very minute ramifications from the iris and the ciliary process, run for a short way in trunks, and perforate the sclerocaps in different parts, in a manner analogous to that of the ciliary arteries, but more particularly at its posterior surface. The venae vorticosae of the choroid, having collected into trunks, follow the same course. The vena centralis retinae collects its branches from the anterior termination of the retina into three or four trunks, which unite into a single one, entering the optic nerve in company with the central artery. The reader will find a minute and most complete description of the veins of the eye, in J. G. Walter’s Epitome de Vinos Oculi. Berkeley, 1778, 4to.

The eye-brow, eye-lids, and lacrymal apparatus.—Considerable protection is afforded to the eye by the edge of the orbit, but its anterior surface is further guarded by several adventitious organs. These parts, to which Hull has given the name of “tutamina oculi,” consist of the eye-brow, the eye-lids, and the parts defined to secrete and remove the tears.

The eye-brow is an arched elevation, covered with hair, placed at the base of the forehead, above the upper eye-lid, extending from the root of the nose to the temple. It differs very much in its length, breadth, and thickness, in different individuals, and is generally very strongly marked in old age. The eye-brow, at its commencement on the nasal side of the orbit, is at different distances from its fellow on the other side; sometimes the two arches meet at the root of the nose, at others there is an interval of more than half an inch. It describes but a slight curve, the convexity of which is turned upwards, and terminates at the temple by a pointed end. The eye-brow is formed by a thick doubling of the skin covered by hairs, by cellular tissue and fat, by a strong muscle, and by bone. It has a plentiful supply of blood-vessels and nerves. The superciliary ridge of the frontal bone contributes very essentially to the prominence of the eye-brow, causing great variety in this respect in different persons.

The orbicularis palpebrarum, and the frontalis muscles, send many of their fibres into the substance of the brow, which are very closely intermixed with the fibres of another muscle, called from its office the corrugator supercili. This muscle is short, made up of numerous muscular fibres, occupying the superior and internal part of the base of the orbit. It is attached by small tendinous fibres, divided into two or three portions, to the protuberance above the nose on the frontal bone; it passes, making a slight curve, over the internal half of the orbit, and terminates by uniting its fibres with those of the orbicularis and frontalis, by which it is wholly concealed. It is separated from the frontal bone by the vessels and nerves coming from the orbit.

The eye-brows are covered by hairs of different lengths, which vary much in number, in colour, and in length, in different individuals. They are more numerous towards the nose, and coarser. Their colour is generally the same with that of the hair of the head. They are generally thicker in brown than in fair persons. The hairs are disposed obliquely, pointing outward, and flan-ging off from the skin; the inferior hairs are turned obliquely upwards, the super or obliquely downwards, so as to elucidate by their points, and form an angular projecting line in the middle of the brow. They are commonly, but erroneously, figured as horizontal. When the eye-brows meet, the hairs next the nose most commonly point upwards. Each hair forms a curve according to its place, and is not straight. It commences by a bulb in the skin, becomes fine, gradually swells in the middle, and terminates in an extremely fine point.

The eye-brow is susceptible of various motions, and forms, by its prominent situation and mobility, a very principal feature in the expression of different passions. It will be elevated by the action of the occipito-frontalis, and considerably lowered by the orbicularis palpebrarum. The corrugator supercili, having its fixed point near the root of the nose, will by its action contract and wrinkle the skin of the brow perpendicularly, drawing the whole towards the nose, producing what is called a frown. When we regard a distant object, or one which reflects but little light, we elevate the eye-brow; we lower and contract it on the contrary, when the object is near, or very bright, or the sensibility of the eye from any cause, too great. Thus it protects the organ from the impression of too vivid a light, and guards it in some measure from foreign bodies.

The eye-lids are two movable bodies, placed in front of the eye-ball, and occupying the whole opening of the bony orbit, which determines their extent; they are distinguished into upper and lower. The upper lid, the largest and most movable, when lowered, covers the principal part of the eye, descending much below its transverse diameter, "infra equatorem oculi descendens;" the under lid rising but a small way to meet it. On the convex anterior surface of
of each we observe a few wrinkles following the curve of the lid, varying in number according to the position of the part. When the eye is open there is always one large fold of the skin in each eye-lid; this is more particularly marked in the upper, in consequence of the levator palpebrae drawing it under the edge of the orbit. The wrinkles are effaced when the eye-lids are closed in sleep, so that they exhibit an uniformly smooth surface. The skin of the upper lid is continuous above with that of the brow; the skin of the lower with the cheek; the only line of distinction is the edge of the orbit, and the depression within the margin. The posterior surface of the eye-lids is concave, smooth, in contact with the globe, and always moist. The edge of each lid is straight for about one-fourth of an inch next the nape, where it corresponds to the caruncula lacrymalis. In the rest of its extent it is slightly concave, corresponding to the projection of the eye-ball, and of considerable thickness, which diminishes towards the temple. The anterior margin of this edge is angular, and supports ranks of fine hairs, called eye-lashes; the posterior is bevelled off, so as to form with the globe, when the eye is shut, a triangular canal, narrow towards the temple, and gradually increasing in size towards the nape. It is particularly large at the angle, where the straight and concave portions of the eye-lid meet, which is marked by a projecting papilla, perforated by the punctum lacrymale. From this point outward, we observe also, between the two margins, a line of small holes, the openings of sebaceous glands. The two lids are united at each end, forming two angles, or canthi, of which the nasoal or internal is a little rounded off, and called the great angle; the temporal or external is acute, and termed the lesser angle. The difference is produced by the alteration in the outline of the lid above-mentioned, and by the disposition of the tendon of the orbicularis muscle. The opening between the lids in different persons varies a little in its transverse diameter, which is measured by the two angles. The perpendicular diameter, depending on the action of muscles, is constantly changing, and determined by the degree of their contraction. We believe it is to the greater or less transverse, and vertical diameters of the opening of the eye-lids in various individuals, and not to any great variation in the bulk of the globe, that the apparent size of the eye is mainly owing. The apparent difference in the volume of larger, or smaller eyes, is certainly greater than can be attributed to a difference in the globe, which we know to vary but inconsiderably.

The eye-lids are composed of many different tissues, disposed in layers, one beneath the other, over a broad cartilage, which gives the figure to the whole. The cartilage mentioned by these is not sufficiently thick to prevent strong lights from affecting the eye. Beginning from the anterior surface, we find successively a fine skin, a mucous, a fibrous expanstion, and a plate of cartilage, on the posterior side of which are sebaceous glands covered by a mucous membrane. In the upper lid there is a second muscle between the anterior surface of the cartilage and the fibrous layer. As the cartilage supports the reft, we shall commence with it.

In the buliine of the opposed margins of the eye lids we find thin pieces of cartilage, named the taris, extending through nearly the whole length of the lids. These differ in form and size. The taris of the upper lid is broad in the middle, narrowing gradually at each end, resembling the segment of a circle, the arc of which is towards the margin of the orbit, and the chord opposite the lower eye-lid. It is much larger than the lower, which is of nearly uniform breadth throughout, corresponding to the external figure of the inferior lid. The convex anterior surface of each corresponds to the muscle, the posterior is lined by a membrane between which and the cartilage are glands. The connected edge of each, thin, in the upper lid convex, in the lower nearly flat, gives attachment to some ligamentous fibres. The ciliary or opposite margin is thick, covered only by the conjunctiva; its particular figure has been already described as contributing to form the triangular canal between the closed lids. The outer extremity of each is fine and pointed, the nasal or internal is rounded, and of greater thickness. The taris are thin and flexible, fibro-cartilagineous in structure, of a yellow colour. As the fold part of the taris, they favour their gliding over the surface of the globe of the eye, keeping them equally extended in every movement. When the upper lid is elevated, its taris passes in some degree under the edge of the orbit, keeping the surface next the globe uniformly smooth, while the skin forms a deep fold in front, the tarus retreating from it partly as it glides far back over the globe. The broad ligaments of the tarus are fibrous productions, extending from the edge of the orbit to the opposite margins of those cartilages. They are very evident, and of considerable thickness next the orbits, where they appear to be continuous with its perioleum. As they recede thence, they diminish very much in thickness, a few fibres only remaining, which are attached to the tarus, the intervals being completed by cellular tissue. They are pierced in many places to give passage to vessels and nerves. This fibrous layer is generally most distinct towards the temporal side of the eye-lids, where it is more evidently attached to the tarus, the fibres decussating each other between the inner angle of the eye-lids and the opposite angle of the orbit, so as to form a tolerably firm band, connecting them together, similar in some measure to the tendon of the orbicularis on the nasal side. In the upper lid, the ligamentous bands lie between the orbicularis and levator in the lower, between the edge of these muscles and the membrane lining the lid. They scarcely deserve the name of tarus ligaments, but they form a dense arch round the orbit, the contents of which they afford in protecting. The tarus of the upper lid, when elevated, passes behind its ligament.

The muscles of the eye-lids are two in number; viz. one common to both, the orbicularis palpebrarum, another belonging to the upper eye-lid only, the levator palpebra superior.

This last muscle is thin, long, and flat, placed in the upper part of the orbit, from the bottom of which it arises, in front of the foramen opticum, immediately before the origin of the rectus superior. It is tendinous at this point, and soon becomes fibrous, passes forwards, making a gentle curve over the convexity of the globe, spreading as it proceeds. Opposite the globe of the eye it forms gradually a thin tendinous expansion, which turns downwards, and is attached partly to the superior margin of the tarus, partly to its ligament on the temporal side, by means of which it is connected with the outer angle of the orbit, the remainder of the tendinous fibres passing down in front of the tarus to its ciliary edge. In this latter part of its course, it is closely connected with the orbicularis in front, adhering by cellular tissue to the tarus on its posterior surface. The upper lid, from its muscle terminating in a broad diverging aponeurosis, spread over the front of the tarus, is further strengthened than the lower, which has only its ligament to protect the lower part.

If we now examine the two lids, supposing them closed, we find their temporal side especially defended by a fibrous expansion, supposing the place of the bony orbit, which, by the obliquity of its bale, leaves the eye more exposed to
EYE.

that part; we find their nasal side with but little of this fibrous covering, which was left necessary, as the ball is defended by the projection of the nose; we observe, moreover, the upper lid forti ed by an additional fibrous layer, formed by the tendon of its levator muscle, a construction the more required here, as it executes almost alone the motion by which the lids are cloosed, and is more directly in the way of external injuries.

Externally to the parts we have hitherto described is a thin, broad, oval mucus, formed of concentric fibres, with a line of division in the middle, corresponding to the opening of the eye-lids, placed in front of the opening of the bale of the orbit, occupying a great portion of the upper part of the face, and named orbicularis palpebrorum. Its fibres on the nasal side have a triple origin: one above, from the nasal process of the superior maxillarv and the orbital process of the frontal bone; another, below, from the anterior edge of the lacrymal groove and the neighbouring part of the bale of the orbit; a third, between these two, to the two edges and front of a small tendon, which passes tranverse from the nasal process of the maxillary bone to the internal commissure of the eye-lids, where it divides, and becomes connected with each tarbus. The tendon in its passage crosses over an aponoeurosis which protects the lacrymal groove, and adheres intimately to it; from this aponoeurosis also a few muscular fibres are derived. The fibres arising from the two fift of these points pass outwards in opposite curves above and below the orbit, and join each other at its temporal angle, after having formed round the lids an oval plane of some breadth, and well defined; a few scattered fibres are intermixed with thoie of the corrugator and frontalis above, others are lost in the cellular tissue and fat of the check below, or sometimes join some of the muscles of the face. On the temporal side of the orbit the orbicularis is very thin, it is much stronger towards the nose. The fibres which are derived from the tendon of the orbicularis are spread over each eye-lid, following the same direction as the preceding, with which they are continuous, and uniting at the external side of the temporal commissure. These fibres are generally paler than the others, and we sometimes can observe them meeting in a tendinous line at the fitter angle. Close to the edge of the lids we find a stronger bundle of fibres, following nearly a straight course, to which the name of ciliaris has been given. The orbicularis is connected with the integuments in front by cellular tissue. It covers the corrugator supercilii, the margin of the bale of the orbit, and some muscles of the face. It is separated from the membrane lining the lids by the ligaments above described, and in the upper by the tendon of its levator.

The febaceous glands of the eye-lids, known under the name of the Meibomian glands, are lodged in grooves hollowed on the posterior surface of the tarbal cartilages. They consist of numerous clusters of follicles, ranged side by side, representing yellow lines, the direction of which is vertical, or tranverse to the length of the cartilage. These lines are more numerous in the upper lid, where we may count between 40 and 40; in the lower they do not exceed the lowest of these numbers. They vary somewhat in breadth, and much in length, especially in the upper lid, in a manner corresponding to the breadth of the tarbus; there are often irregular short lines between the longer ones. They are not so long in the lower, its cartilage being much narrower. These lines are generally parallel; some of them may be straight, others tortuous, separated by intervals unequal in breadth. Two of the lines often unite to form one, some with their angle of union turned towards the ciliary edge, others meeting in an arch convex towards the connected edge of the tarbus. The follicles which form them are exceedingly numerous, disposed in bunches; they communicate with each other, and open near the posterior edge of the tarbus by a row of minute holes, before mentioned. These follicles secrete a mucus fluid, which hardens after death, and may be pressed through the holes in a solid form, resembling little worms.

The parts we have described are covered anteriorly by the skin, and on the posterior surface by a membrane continuous with it, called conjunctiva. The skin investing the eye-lids is much thinner than that of the brow or cheek, and becomes more and more limbeable as it approaches the ciliary margin of the tarbus. A loose cellular tissue, in which we never find any fat, but frequently an effusion of serous fluid, lies between the skin, and the orbicularis behind it. As the lid moves at the anterior margin of the eye-lid, it is perforated by numerous holes, from which the cilia, or eye lashes, are produced. These hairs form two or more rows, are more numerous, and longer in the upper lid; they are more numerous and longer also in the middle of each, than at the extremities, and we find only a few fine hairs between the punctum lacrymale and the nasal angle. Each hair is curved in its direction; beginning from a bulb, it is at first very fine, swells in the middle, and terminates in a conical extended point. In the upper lid they are first directed downwards, turning up towards the point; in the under the direction is inverse. They differ in colour in different persons, but are generally, though not always, of the colour of the rest of the hair.

At the free formed by the eye-lashes, the skin becomes changed in appearance and structure, and we observe continued from it a mucous membrane, called, from its office, the conjunctiva, which, after invvelling the posterior surface of the tarbus, is reflected over the front of the eye-ball. Tracing it from the edge of the upper lid, we find it first by the integuments of the Meibomian glands, dipping into the canal of which the punctum lacrymale is the opening, and spread over the lid a short way beyond the convex edge of the tarbus. Abandoning the lid, it turns over the globe, two-thirds of which it covers, below is reflected again to be extended over the lower lid to the ciliary margin. From this disposition the conjunctiva presents two surfaces, one connected with the parts it covers, the other exposed. The latter is smooth, and confluently moistened by secretory fluids. The former is united to the lids and the globe by cellular tissue. On the eye-lids it adheres closely to the tarbus, more loosely to the fibrous membrane, to the orbicularis below, and to the tendinous expansion of the levator above. In quitting the lids to invest the globe, it forms a loose circular fold which corresponds behind to the lid in the orbit, and which, extending further in the upper lid, is lodged during its elevation in a small angular space left for it in the fat behind the margin of the orbit. By this means, transverse folds in the conjunctiva, such as we have remarked in the skin, are prevented when the upper eye-lid is raised. On the globe of the eye the conjunctiva adheres loosely to the sclerottica, giving it a smooth and gliftening aspect. On the cornea it adheres very closely, and is very thin. In this course the conjunctiva forms at the internal angle of the eye a semilunar folf, concave outwards, something like the third eye-lid in birds. This fold, which appears larger when the eye is turned towards the nose, disappears when it is turned far towards the temple. The conjunctiva may be considered as a mucous membrane, from the general character of its structure: it has not, however, a villous surface, neither is the fluid which it secretes of much consistence, in some particular inflammations of this membrane it becomes thick.
thick and yellow. Although described under the single epithet of conjunctiva, and obviously a single and continuous membrane, its organization differs very considerably at different parts. Anatomists call that portion which lines the lids, \textit{conjunctiva palpebrarum}; and that which covers the globe, \textit{conjunctiva occlud.} The former contains very numerous red vessels, visible in its natural state, and occasioning the membrane to assume a general redness when injected. The latter has very few apparent blood-vessels, and its whitenefs constitutes the white of the eye. But this part under inflammation becomes entirely covered with vessels carrying red blood. That portion of the membrane covering the cornea is again very different from what is connected to the terebreres, being completely transparent. That the conjunctiva is actually continued over the cornea cannot, however, be doubted. For, although the latter part is infensible, its anterior surface is endowed with the fame exquisitely feeling as the rœl of the conjunctiva. In amphibia, which shed their epidermis at certain seasons, this membrane comes off from the front of the eye with the rœl of the cuticle; the same fact may be observed in skinning an elk, and in the zemi, or mus typhus of Dallas it is covered with fine hairs. It is very sensitive, and irritated by apparently slight causes. The eye-lids are supplied with vessels and nerves in great abundance from the neighbouring trunks.

Such is the structure of the eye-lids. Their life appears to be that of covering the eye during sleep, of protecting it from accidental violence, of excluding the light when offensive, and of keeping the surface of the eye coolantly moist, by spreading a fluid, the fources of which we have yet to describe, uniformly over its surface. These purposes are fully provided for by their organization and disposition, and executed by the muscles which enter into their structure. The conjunctiva is a loose membrane supported by ligaments, preserve an uniformly smooth surface; the faceous glands secrete an abundant lubrication, which prevents the adherence of the lids in sleep, or when brought into contact by the rapid and frequently repeated action of winking; which, in conjunction with the chia, prevent infects, dust, or any small bodies from injuring the surface of the globe; the conjunctiva presents two moiftened polished surfaces, which easily glide over each other, and it favours, by the loosenefs of its attachment, the motions of the lids. With regard to these lal, when the eye is opened after sleep, the lower lid does not alter its situation, the opening is made by the upper lid descending by the action of its levator muscle under the edge of the orbit, where there is space to receive it only by loose fat and cellular tissue. If the opening of the eye-lids succeeds a closure of them, effected by the action of the orbicularis, this muscle, by its relaxation, concerns in producing their separation. This will appear evident if we consider that the closure of the eye is produced very differently in the different phases of sleeping or wakening. In the former case the muscles of the lids are paralized, giving to the relaxation of the levator muscle, and the falling down of the upper lid; an effect analogous to what is seen in a paralysis of that mufeule, where the eye cannot be opened without external aid. In the lal the closure of the lids is active, produced by a contraction of the curved fibres of the orbicularis, which by this action approach nearer to a straight line. In the lal case also, the particular motion of the eye-lids, called winking, is caused in a great degree by the relaxation of the levator, and its alternate contraction. We believe this motion to be designed to keep the surface of the cornea clean and moist, to transmit the rays of light; but it is also neccessary by the disposition of the several parts; the levator not being able to remain in a state of permanent contraction, since it is a voluntary muscle, is of necessity relaxed at intervals, and causes the motion of winking, which is further asifled perhaps by a flight action of the orbicularis. Further, in closing the eye-lids when awake, the orbicularis acts with lfs or greater energy. When we wish to defend the eye from a vivid light, it contracts strongly in company with the corrugator supercili, and collects the integuments of the forehead and cheeks in numerous folds to bury as it were the eye more deeply. The orbicularis and levator are then to a certain point antagonists, one opposing the other closing the eye-lids; in some cases their actions are combined.

\textbf{Lacrimal apparatus.}—The parts which remain yet to be described, and which have been included under the general name of the lacrymal apparatus of the eye, are the lacrymal gland and caruncle, the lacrymal points and ducts, the lacrymal sac, and the common canal leading into the nofe. In animals that live in air, the anterior surface of the eye would soon become dry, and be rendered fuel by dust, or the numerous small bodies floating in the atmosphere, were it not constantly bathed by a limpid fluid. A part of this we believe to be furnished by the conjunctiva; but its more abundant fource is from the \textit{lacrymal gland.} It is usually known by the name of the \textit{tears.}

The lacrymal gland is situated at the superior, anterior, or external part of the orbit. It is somewhat flattened, nearly an inch in length, and half an inch in breadth. It is divided partially into two lobes, of which the internal and upper is the smallest. From its flattened form we shall consider it as having two surfaces. The upper convex side correfponds to an opposite depression in the bony orbit; the concave inferior surface to the globe of the eye, and to the superior and external peace muscles, with which it is connected by cellular tissue. Of its two extremities, the internal, or that turned towards the nose, is thin and narrow; the external and inferior end is broader, and of greater thickness. There is a small ligament, first described and figured by Soemmerring, passing from the external and posterior part of the lacrymal fossa underneath the gland, which it retains in its situation. The lacrymal gland is formed by many small lobes united by cellular tissue, the vessels and nerves being lodged in the intervals. These little lobes are themselves made up of small granules, into the substance of which the vessels penetrate. It is supplied with arteries from the lacrymal branch of the ophthalmic; with nerves from the lacrymal branch of the nerve of the fifth pair. The excretory ducts of this gland are very apparent in the larger animals; in man they are not so readily perceived. Their number is generally seven; they pass out from the anterior edge of the gland, descend in the substance of the upper lid between the ligament and the conjunctiva, on the surface of the lash of which they open on the temporal side about 1/4 of an inch above the convex edge of the tarsus. The ducts have no communication with each other.

\textit{The caruncula lacrymatis} is a small reddish body situated between the internal angle of the eyelids, and the superior surface of the globe of the eye. It is oblong and conical in form, its summit correfponding to the eye-lids. It differs much in colour, from a pale pink to a full red in different individuals. It is composed of a number of mucous follicles, united by cellular tissue, and covered by the conjunctiva. On minute examination we may find very fine hairs growing from its surface. It appears to secrete a mucous fluid, and perhaps from its situation may affit the pillage of the tears into the lacrymal puncta.
The puncta lacrymale form the openings of two short tubes, named the lacrimal ducts, and distinguished by the epithets superior and inferior, from their situations in the two lids. These canals are formed in the substance of the lids, and are nearest to their posterior surface: they are larger than the area of the puncta, and the superior is rather longer than the inferior. Their direction is nearly inferior; the superior canal ascends for a short space, turns inwards at an acute angle, and descends obliquely; the inferior first passes downwards, makes an acute angle, and then goes obliquely upwards. The direction of the superior canal must vary as the lid is elevated or depressed: the change, however, can never be very considerable, as the lid describes but a small space at the internal angle in any of its motions. The canals gradually approach each other, following the margin of the lids, and separated by the caruncle; at the internal angle they unite to form a common duct, which is continued for a very little way behind the tendon of the orbicularis, before it opens into the lacrimal sac, somewhat above the tendon. Sometimes these canals are separated throughout by a thin partition, and open in the sac by two distinct mouths; generally, however, this intervening membrane is not continued to the opening into the sac. The lacrimal canals are lined by a fine membrane continued from the conjunctiva.

The lacrimal sac is a membranous bag, lodged in a groove formed by the os unguis, and the nasal process of the superior maxillary bone. It is of an oval form below, and a little flattened transversely. It is covered on its anterior surface by a fibrous membrane attached to the circumference of the lacrimal groove, strongly connected with the tendon, and with the muscular fibres of the orbicularis. On its external side are the caruncle and the conjunctiva, and anterior to these the orbicularis and the skin. The inner side is closely adherent to the lacrimal groove. The upper end of the sac is closed, rounded, and extends a little way above the tendon of the orbicularis. The lower end terminates by a contracted portion, which opens into the nasal duct. On the external superior part of its anterior surface we remark the openings of the lacrimal canals. The sac is formed by a mucous membrane continuous with the conjunctiva, and the membrane lining the nostrils, the latter of which it much resembles. It is invaginated, where not lodged in the bone, by the fibrous membrane above-mentioned.

The inferior end of the lacrimal sac is continued by a circular fold of the membrane, through which it communicates with a very large tube, called the nasal duct, or ductus ad nasum, which opens below the inferior turbinate bone in the nostril. It is enclosed in a bony canal, formed by the union of the bones which surround the lacrimal fac, and at the lower end by the inferior turbinate bone. The duct is not quite half an inch in length; it is often contracted about its middle. Its direction is from above obliquely downwards, and a little outwards and forwards, describing a gentle curve with the convexity in front. It opens in the inferior meatus narium by an oblique slit in the pituitary membrane, which is often fo loose as to form a valve over the aperture. The area of the opening is never to large as that of the duct, but it differs much in individuals an instrument can be passed into it from the anterior opening of the nostril. The membrane of the nasal duct is similar to that of the fac: we can observe mucous crypts here and there on its surface. It adheres to the fibrous membrane lining the bony canal.

We include, under the appellation tears, the whole fluid poured out on the surface of the conjunctiva; and produced in part by that membrane, but chiefly by the lacrimal gland. Superficial observation would lead a person to conclude that its ordinary quantity is small, and only sufficient, by lubricating the parts, to facilitate their motions. For we notice no actual fluid in the eye, and observe merely a moist film of the conjunctiva. When, however, the passages which carry off the tears into the nse are obstructed, and the fluids which ordinarily descend into the nostril, where they are evaporated by the constant current of air through that cavity, flow over the cheeks, we find that the natural quantity of the tears is very considerable. As the conjunctiva belongs to the class of mucous membranes, its secretion has the properties which belong to those of similar organized parts. This, when freed by evaporation from the more aqueous portion of the tears, forms the irritations observable about the eye-lids after sleep; and would constantly agglutinate their margins at that period, were they not defended from its action by the nebulous matter of the Meibomian glands. Hence, when the latter parts do not furnish this greatly sub stance, or when the conjunctiva, in a diseased state, pours out an increased quantity of mucous fluid, the ciliary margins become adherent in a very disagreeable manner during sleep. The secretion of the lacrimal gland is aqueous, but contains much saline matter. The chemist discovers in it common salt, phosphates of lime, phosphates of soda, and soda in an apparently uncombined state. Indeed the bitterish saline taste of the fluid produced in weeping is a circumstance of common vortion. It appears probable, that the conjunctiva is the ordinary source of the lacrimal fluid, which constantly lubricates the globe and lids; but when any irritation affects the organ, or when a foreign body, a particle of dust, &c. is lodged within the lids, a large quantity of fluid is suddenly poured out from the lacrimal gland, and often washes off the offending sub stance. The saline nature of this fluid actually produces a degree of redness in the conjunctiva, which the natural mucilaginous secretion of that membrane does not occasion; and this difference indicates a diversity in the nature of the fluid. The tears furnished in such a case are much more copious than the lacrimal passages can convey into the nose; and they consequently overflow the lids. A similar increased secretion from the lacrimal gland, taking place under various mental affections, constitutes weeping. The lacrimal fluid is spread uniformly over the anterior surface of the eye-ball, by the alternate lowering and elevation of the superior lid, an action so rapid, that although constantly repeated at small intervals, it appears not to impede the functions of the organ. These motions cause it to flow towards the nasal duct, along the triangular canal formed by the posterior edges of the lids. The lachrymal matter of the Meibomian glands probably prevents it from overflowing their margins. It is directed towards the internal angle, when the eye is closed, by the form of this canal increasing in size towards the nse; and by the

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action of the orbicularis, which has its fixed point at the same part; when the eye is open, by the inclination of the lower lid, as the external angle is then higher than the internal. The puncta lacrymalia take up the tears by a peculiar vital action, and not by capillary attraction. From these canals the fluid passes into the lacrymal sac, and thence into the nostrils.

The parts above described are very fully developed at the time of birth; corresponding in this respect with the almost perfect state of the globe itself at that period. The eye resembles another organ of sense, the ear, in the forwardness of its evolution, and in the early period after birth, in which its functions are called into exercise. They are both analogous in this point of view to the organ of touch. The mutual affinities which they afford each other, in correcting erroneous ideas formed from the separate use of either, is much favoured by this early and contemporaneous completion of their structure.

A knowledge of the forms, proportions, densities, the refractive and dispersive powers of the humours, as well as the radii of their several curvatures, is essential to understanding rightly the physiology of the organs. Our limits will not allow us to detail the numerous experiments which have been instituted to determine these points. The following admeasurments and calculations are drawn from those given by Petit, Maitelyne, Comparetti, Young, Wollaston, and Cavallo; to all of whom the reader, who wishes for minute information, is particularly referred.

The axis of the human eye, measured from the anterior surface of the cornea to the foramen opticum, is about 2/8 of an inch: of this, the cornea occupies about 3/4; the aqueous humour 1/11; the chryftalline 1/7; and the vitreous 66/1.

The diameter of the eye, measured internally, from the opposite surfaces of the retina, is about 8/90.

The vertical chord of the cornea is about 4/47, and the horizontal 4/49. The radius of its anterior convexity is 3/35; its veried line 1/11; its distance from the anterior surface of the chryftalline 13.

The radius of the sphéricity of the inner surface of the felerotica 4/42.

The aperture of the pupil at a mean 1/14.

The radius of the anterior convexity of the chryftalline 1/44; of the posterior 2/22.

The refractive and dispersive powers of the aqueous and vitreous humours are very nearly, if not exactly, the same at those of water; those of the chryftalline are, for its whole substance, as 14 to 13.

By calculating from the preceding data the progres of rays, supposed to radiate from an object about 16 inches distant, it is found that they will be collected into foci, nearly on the surface of the retina; from the different refraffuence of the rays, perhaps not in exact focal points, but the circle of dispersion is so minute, as hardly to be worth considering in the physiology of the organ.

The axis of the eye is in a line drawn in the axis of the cornea. From the excentricity of the pupil, and chryftalline lens, with regard to the cornea, their axes are not in the same line with that of the latter; and the visual axis is found to be one twentieth of an inch further from the optic nerve than the point opposite the centre of the pupil; and about 3/4 of an inch on the outside of the centre of the nerve.

**Description of the Plates in which the Anatomy of the Eye is represented.**

**Plate I.**

The figures in this plate represent the external parts of the eye in different positions, and exhibit the principal varieties depending on sex or nation, as well as the appearances of the closed eye- lids during sleep.

Fig. 1.—The figures in the upper line exhibit the left eye of an adult male in a front and side view. We begin with the fift,

a & c, the eye-brow, or supercilium; a, its end next the nose; c, that towards the temple.

b, d, the upper eye-lid, or palpebra; the part which has but little motion; d, the fold which disappears when the eye-lids are closed; the depth of it may be seen in

Plate IV, fig. 5: the edge fringed with the eye-lashes or cilia.

e, f, m, the opening of the eye-lids.

f, g, b, the internal, or larger canthus of the eye; c, the caruncula lacrymalis; f, the semi-lunar fold of the conjunctiva; e, b, a depression round the caruncle ("hæmus lacrymalis"); g, the situation of the ligament of the palpebra crossing the lacrymal fac.

k l, an horizontal line, showing how much the internal canthus is inferior to the external.

m n o p q, the lower eye-lid; m, its margin; n, the internal edge or limbus perforated by the openings of the lacrimal glands; p, the external edge, from which the lower cilia or eye-lashes arise; q, a superficial fold, observed when the eye is opened.

r, the external or lower canthus of the eye.

d e f g h, the iris, drawn through the transparent cornea; e, f, the narrower part next the nose; e g, the wider part towards the temple; e f, the inner, or first circle of the iris; f g, the outer, or larger circle; h, the pupil.

In the side view, we observe some points not distinguishable when the organ is viewed in front. We shall explain the letters only when affixed to different parts from those in the former figure.

d e f g h, the upper eye-lid; e, the fold; f g, the breadth of its margin; g h, the upper eye-lashes, decreasing in number, length, thickness, and curvature, as they approach the external canthus.

i k, the cornea; i, its convexity; k, its circumference.

l, the iris, which can be seen in the side view, by the alteration in the direction of the rays in passing through the aqueous humour. The iris would not be seen if the eye was viewed in the same manner under water; the cornea alone would appear.

Fig. 2.—The figures in the second line represent the female eye, seen in the same circumstances as the male eye in the line above. The differences between them are sufficiently evident to merit attention. The male eye excelles the female in the relative size of the eye-ball, in the thickness of the parts which are connected with it, as well as in many other lesser variations of form, all of which are marked with great effect in the beautiful specimenes of ancient sculpture.

In the male, the skin of the eye-lids is hard and rough, with a degree of redness not observable in the female, where it is more delicate and smooth, pink, and apparently humid. Viewed generally, the prominent, full-erbe eye of the male has a bolder character than the obtuse, depressed, and gentle eye of the female. The skin of the brow is thicker, and has a greater projection; the
eye-brow itself is broader, thicker, and formed of hairs of greater length, and coarsefins, not lying so close to the skin as they do in the female. In the male, the upper lid is more elevated, so as to appear smaller; the fold is therefore larger, and nearer the eye-brow. The opening between the eye-lids is wider and rounder, the angle at the corners is greater, and the margin of each is broader. The eye-lashes are thicker, and not so fine. The differences we have noticed are not equally evident in all eyes, but are sufficiently striking where this feature has its exquisite distinctive form correctly marked.

Fig. 3.—The two figures represent the eye of the male adult negro. In the left:

a, b, c, d, e, f, the eye-brow, formed of short, scattered hairs.

d, e, f, g, the upper eye-lid, full, puffed, and broad; e, a superficial; f, the deeper fold.

g, b, p, the opening of the eye-lids, rather oblong; h, the internal angle, which appears narrow from the thickness of the lids; i, the caruncle, which, for the same reason, appears deeper; * the lined fold.

k, l, m, o, p, the lower eye-lid, comparatively broad; h, the outer edge of the margin of the lid, somewhat rounded; m, the orifices of the sebaceous glands, appearing as white points; p, the external canthus.

In the side view of the same eye we observe further differences.

†, part of the forehead.

e, f, g, h, i, the upper lid; g, its thicknesses; i, the eye-lashes, more curved than in the European.

k, o, p, the lower lid; h, its outer edge, rounded; n, the lashes, as much curved as the upper.

p, the outer canthus.

* the root of the nose. From this it appears how nearly the eyes are on a level with its edge, differing much in this respect from the European.

In reviewing the principal differences between the eyes of the Negro and European, we observe, that in the former the eye-brow is thin, and projects but little over the eye lid, so as to throw but little shade on the eye; the hairs are not woolly, but nearly as straight as in the European. The eye-lids are thicker, and denser in their texture, and tumid, so as to give the eye the appearance of being buried more deeply in the skin of the face. Hence many rays, which would fall on the globe at small or acute angles, are diverted from it; and the light can affect the eye but little when the lids are closed. The lower lid is broader and more moveable, covering a greater portion of the eye. The opening of the lids is narrow; their margins are tumid, and the outer edge rounded. The eye-lashes are more curved, and thicker; and are so extremely fine and black, as to exclude many rays of light. The conjunctiva is not so white, and the fold at the inner canthus is broader. The cornea appears smaller, and not so convex; the bulb itself larger. The almost uniformly dark colour of the iris is so intense, that, when viewed at a little distance, we can scarcely distinguish it from the pupil, the whole appearing as a dark spot. This much diminishes its brightness. The preceding facts lead us to conclude that the eye of the Negro can bear more light, and is better suited to an African sky, than that of the European, who enjoys, perhaps, a larger field of vision, from the direction of his orbits. The differences are not equally observable in all individuals of the two races.

Fig. 4.—The left eye of a young white negro (Leucaethiopils, or Albinets) is here represented. The character of the female eye is strongly marked in these figures; which however differ remarkably from the preceding ones of the male subject, as well as from those of the European female. The eye-brow is soft, of a yellowish or pale white colour, and straight, with the hairs scattered. The lids are puffed, and puffed rather the colour of chalk than of flesh; and the skin is fleshy instead of being smooth. The upper lid appears comparatively very narrow. The opening of the eye-lids is narrow, particularly when the light is at all strong. The eye-lashes are delicate and much curved, especially in the lower lid, where they are exceedingly close; they are of a pale white. The caruncle is not so red; the cornea more convex. The iris, formed of thin, delicate reticulated fibres, appears of a pinkish white colour, and is transparent, that between the fibres we can see the rose colour of the bottom of the eye; in other words it shines through the iris. The iris itself is in an almost constant state of tremulous motion.

Fig. 5.—The eye of an adult female, drawn in a state of tranquil sleep.

a, b, c, d, e, f, the eye-brow; g, the upper eye-lid, smooth and refreshed; h, the eye-lashes, deciduating each other.

b, h, a line drawn horizontally, shewing the external canthus to be the lowest.

k, l, the situation of the iris, or rather of the cornea, projecting under the lid.

m, n, o, cutaneous veins, shining through the delicate skin.

g, r, the fold of the lower lid.

In the side view of the same eye, a, c, &c. denote part of the forehead; b, the root of the nose; e, the eye-brow; d to g, the upper lid; k, the middle part, which is folded when the eye-lids are opened. The projection of the cornea is evident in this view. The other letters point out the same parts as in the former figure.

In the state of quiet sleep the eye-lids are gently closed; the upper one smooth and unwrinkled, defends lower on the outer than on the inner side, and hangs as it were obliquely. The cause of this difference is in the structure of the two angles; the upper lid having but little motion at the inner angle, on account of the tendons of the orbiculatius muscle, while it defends freely at the external canthus. The bulge of the eye is somewhat turned upwards, as we may observe in drowsy persons; so that when the eye is shut, the cornea, with the greatest part of the globe, is covered by the upper lid alone. This situation of the eyelids is very manifest in children when asleep; the cornea in them shining through the thin eye-lid, appearing as a dark spot, and its convexity being visible when viewed from the side. The lower lid generally retains its fold. The difference in the angular form of the two canthi is still obvious. The eye-lashes deciduate each other; and, if the eye be naturally prominent, the cutaneous veins are seen scattered over the upper lid.

Plate II.

The figures in this plate illustrate the structure of the eye-lids and of the lacrimal apparatus.

Fig. 1.—Exhibits the orbicularis muscle of the left eye in the adult.

a, b, the opening of the eye-lids closed; c, the tendon, which joins the eye-lids at the internal canthus, and is fixed into the nasal process of the superior maxillary bone; d, muscular fibres attached to the bones; e, f, fibres intermixed with those of the corrugator supercili and frontalis; g, delicate bundles of fibres covering the upper lid; h, fibres covering...
EYE.

covering the lower lid, joining the preceding at the outer angle; b, stronger fibres attached to the bone, and the tendon; i, fibres passing towards the nose; l, m, thin fibres towards the temple; n, muscles going over the cheek; c, s, scattered fibres at the outer edge; p, p, close fibres immediately surrounding the edge of the eyelids, called by Albinius "musculi capsulae".

Fig. 2.—The eye-lids opened widely, and the margins turned out a little.

a, the eye-brow; b, the fold of the upper lid; c, the openings remaining after having pulled out the eye-lashes; d, the punctum lacerum; e, the upper edge of the internal canthus; f, the orifices of the lacrimal glands; g, the union of the two eye-lids, externally; h, the canaliculi; i, the semi-lunar fold of the conjunctiva; j, the fold of the lower lid; k, the openings after having pulled out the eye-lashes; m, the punctum lacerum; n, the lower crus of the inner canthus; o, the mouths of the lacrimal ducts. The marks left by the cilia are far more numerous in the upper than in the under eye-lid, as well as larger. The openings of the lacrimal glands are placed in a curved line, and rather nearer to the inner edges of the tarth. The puncta lacrimalia, or openings of the lacrimal ducts, are much larger, and placed in a small papilla.

Fig. 5, and 4.—A long and short hair taken from the eye-brow, magnified to four times their natural sizes; a, the bulb, buried in the skin, which becomes thinner at b; and is continued swelling, cylindrical, and curved, c, and terminates in a fine point d.

Fig. 5, and 6.—Two hairs from the eye-lashes, magnified. They begin also in a small bulb, a; diminish in size considerably at b; become gradually thicker, c; are thickest about their middle, d; again decrease in a conical form; e; and end in a very fine point, f. These figures point out the differences in the shape of the hairs of the eye-brows and the lashes, or cilia.

Fig. 7.—The eye-lids of the right eye, moderately open, seen from behind, with the lacrimal gland turned a little forwards, covered at its anterior point by the conjunctiva.

a, a portion of the orbiculares palpebrarum, on its inner surface; b, the angle between the lids; c, the lacrimal gland, on its external side; d, its ducts to the principal lacrimal ducts; e, the openings of its ducts; f, the openings of the excretory ducts of the lacrimal gland; g, the conjunctiva, lining the internal surface of the eye-lids; h, the part which appears folded has been turned off from the bulb; i, the lacrimal glands of the upper lid, shining through the conjunctiva; j, the superior punctum lacrimal; k, the glands of the lower eye-lid; l, its punctum lacrimal, or mouth of the lacrimal duct; m, the canaliculi; n, the semi-lunar fold of the conjunctiva. This is drawn back a little by the other folds of the membrane; its natural situation would be at t.

Fig. 8.—The internal or posterior surface of the eye-lids, to shew the structure of the excretory glands. The figure is magnified to twice its natural size, which may be seen by comparing it with the preceding one.

a, the orbiculares palpebrarum; b, the opening of the eye-lids, through which the cilia of the upper lid are discernible; c, the levator palpebrae superioris; d, the openings of the excretory ducts of the lacrimal gland; e, the conjunctiva, the lacrimal glands shining through it; i, the posterior orifice of the conjunctiva; k, the openings of these glands; l, the lacrimal glands of the lower lid wholly exposed, so as to shew their disposition in rows made up of small bunches united with each other.

Fig. 9.—This may be considered as the reversed appearance of fig. 2. The true relative situation of the lacrimal gland, and of the lacrimal ducts, is particularly pointed out.

a, b, c, d, the upper and lower lacrimal canals as contained in the eye-lids; a, a, the openings or puncta lacrimalia; b, b, the blind pouches formed by each; c, the continuation of the canals; d, d, their openings in the lacrimal sac; e, f, the lacrimal sac; e, the blind flatus at its upper end; g, its termination below in the nasal part of the lacrimal canal; h, i, the termination of the duct in the nostril.

Fig. 10.—The lacrimal duct on the left side, viewed from the side next the nose, to give an idea of its direction, breadth, and of the opening in the nostril. It will be seen to be much wider on this, the internal, than on the anterior side.

a, h, the palpebral portion; c, d, the lacrimal sac; e, f, the nasal portion; f, the natural appearance of its opening in the nose, not disturbed by the introduction of any instrument.

Fig. 11.—The lacrimal canal laid open, and halved, to shew its internal capacity, its thickness, and its structure.

a b e d, as in the preceding figure; a, a, a doubling, or fold of the internal membrane, which marks the end of the lacrimal sac; e, f, the nasal portion of the duct; f, a fold in the inner membrane, sometimes observable; b, follicles, or crypts, which may be seen scuttered up and down the membrane, especially after a successful injection.

PLATE III.

The figures of this plate exhibit the muscles of the globe, and the nerves belonging to them; together with the more intimate structure of the globe itself.

Fig. 1.—The muscles of the bulb of the left eye, with the levator of the upper lid, in their relative situation to each other, and to the bony orbit in which they lie.

1 2 3, the outer-line of the left orbit; 1, 2, the internal; 3, the external side; 3, 2, the inferior margin; 4, the cartilaginous pulley for the tendon of the obliquus superior; 5, the bulb of the eye; 6, 7, the optic nerve; 6, the part which lies on the filla turcica; 7, the part which enters the orbit.

The levator palpebrae superioris: a, its posterior tendinous extremity, adhering to the dura mater at the upper margin of the foramen opticum; b, its connection with the rectus superior; c, its muscular part; e, its anterior tendinous end at the margin of the upper lid.

f, g, the rectus superior, almost wholly covered by the levator palpebrae.

b i k, the rectus externus; i, the anterior attachment of the obliquus inferior; m, the rectus inferior; n, o, rectus internus; p, q, obliquus superior; r, s, its fibrous fibres, arising partly from the tendon, p; partly from the orbit; and terminating in the tendon, i, which passes through the pulley 4, and spreads over the bulb.

Fig. 2.—The same parts; the levator palpebrae, rectus and obliquus superior, optic nerve, and globe of the eye having been removed.

a b c, the rectus internus; d e f, rectus inferior; g, i rectus externus: it is split at its posterior tendinous end, g, to allow of the passage of nerves; k, l, the obliquus inferius; i, its attachment to the perioleum of the superior maxillary bone.

Fig. 3.—The trunks of all the nerves belonging to the eye, in their relations to the cranium, the orbit, the muscles, and the other parts of this organ. As this figure, exclusively of the nerves and lacrimal gland, is precisely the same with
with fig. 1, the letters of reference to the muscles are entirely omitted, to prevent obscurity.

2, the optic nerve; its final distribution will be seen below; 3, the third nerve of the brain or motor oculi; 4, the fourth nerve, or trochlearis; 5, the fifth nerve; A the contracted portion next the brain, which swells considerably at B; C, the first branch of the fifth entering the orbit; D, the second branch which passes through the foramen cecum, E, the third branch, which enters the foramen ovale F F.

The first branch of the fifth, after giving off a filament, 6, which joins the fourth, divides into the ramus frontalis 7, 8, and the nervus lacrimalis, 9. The ramus frontalis sends a small twig, 9, to the neighbourhood of the trochea; another, 10, which joins the nervus infra trochealis, 11, The proper frontal branch, 12, is stretched over the levator palpebrae superiores, without sending any twig to it, and is distributed to the forehead 13, 14, the lacrimal nerve, the branches of which separating and reuniting, may be divided into two principal parts, an internal, 1, and an external, 2. The inner branch, communicating with the external, 2, goes towards the lacrimal gland, in which it is partly distributed, a few filaments running on in conjunction with some from the external branch 15, 16, to the orbicularis, and skin of the upper lid, 17. The external branch is scattered in the substance of the lacrimal gland, and communicates by different filaments with the inner branch, 2; with the third branch of the fifth, 4, 18; and is finally lost on the upper lid; 4, a small twig which enters the orbit from the facial nerve.

6, 6, 6, the sixth nerve of the brain. It is covered by the fifth, as far as D, entering the orbit with it. It is distributed on the rectus externus.

Fig. 4.—This figure exhibits more particularly the distribution of the third nerve, and the structure of the lenticular, or ophthalmic ganglion. It corresponds with figs. 1, and 3, the fourth, and most of the branches of the fifth are removed. The levator palpebrae and rectus superior are turned a little aside.

A A, the rectus superior turned off, so as to exhibit a part of its lower surface; B B, the levator palpebrae in the same situation.

3, 3, &c. the third nerve. At its very entrance into the orbit, a small branch, b, is soon given off, which is joined by a small filament from the first branch of the fifth, u, and then divides into a branch for the levator palpebrae, d, and another, e, for the rectus superior; e, the greater branch, pales under the optic nerve on the outer side of the latter. It divides into an inner twig for the rectus internus; a middle one, f, for the rectus inferior; and an inferior, g, which again subdivides a short but rather thick portion, h, joining the ophthalmic ganglion, and a longer, thinner, i, passing to the oblique inferior. From the ophthalmic ganglion two filaments of the ciliary nerves proceed. The smaller and superior fasciculus splits into three filaments, k, l, k, which pursue a serpentine course near that of the optic nerve, dividing into fix or more unequal portions, k, l, k; three of these may be seen entering the sclerotic. The inferior fasciculus, rather the largest, generally divides into fix filaments, two only of which, m, m, are here apparent.

5, the fifth nerve; n, the fifth branch of this nerve; four of its twigs are cut off; o corresponds to in fig. 3; 3, p to b; q to e; r to k; s, a fifth twig from this nerve, dividing, into a nipple twig, t, which is cut off, into another, m, communicating with that twig of the third which goes to the rectus superior; and into a small filament which joins the ophthalmic ganglion.

6, s, the sixth nerve, or abductor, passing to the rectus externus at c.

The remaining figures represent minutely the structure of the globe of the eye.

Fig. 5.—The anterior half of the left eye, after the organs had been divided perpendicularly; the other half forming fig. 6; w, the cut surface of the sclerotic, of nearly uniform thickness all round; k, the dark-coloured substance between the sclerotic and choroid; c, the tunica choroidis, appearing in folds from being cut; it is really spread uniformly smooth over the retina; d, the pigmen tum nigrum, between the choroid and retina; e, f, the retina; e, e, its cut margin, folded and turned in; f f, its anterior termination, seen more distinctly in figs. 5, 9, 10; g, b, the ciliary body, shining through the remains of the vitreous humour. From the great quantity of pigment covering it, its folds can be seen distinctly only towards the margin of the crystalline lens. It is manifestly not covered by the retina; h, the space between the ciliary processes and the lens, shown by w e in fig. 7; i k, the crystalline lens, included in its capsule, seen through part of the vitreous humour; i k, the iris, broadest at the outer side; b, the pupil.

Fig. 6.—The posterior half of the preceding section; a b c d, as in the foregoing figure; e f, the retina, on its inner surface; the margin of much wrinkled; f, the round spot, showing the entrance of the optic nerve; g, b, branches of the central artery, and vein of the retina, filled with blood; b i, two branches, which surround in a circle the foramen centrale, or centre of the retina; k, edged by a yellow ring, concealed in this view by the folds of the retina.

Fig. 7.—The lower half of the eye-ball divided horizontally, or at right-angles to the section exhibited in the two preceding figures. Its axis lies between the points 3, d.

d—d, the sclerotic; b, its thinnest part, under the tendons of the recti muscles; c, its middle portion, thicker; d, its thickest part, united with the sheath of the optic nerve; e, an hemispherical rising in the sclerotic, pierced by holes, through which the media of the optic nerve passes, to be expanded in the retina; e r, the iris; s, its posterior surface, covered by pigmen tum nigrum; u w, the retina; u, its anterior margin, or termination; w, its internal surface, seen through the vitreous humour; 1 2 3, the optic nerve divided; 4 5, the sheath of the nerve, consisting of two lamina; 8, marks of the central vessels of the retina perforating the optic nerve. The nerve diminishes very much in size at 6.

Fig. 8.—The posterior surface of the retina of the left eye, drawn from behind; the true centre of the retina falling exactly in the middle of the figure.

a, the retina spread over the vitreous humour, so placed as to fit the position of fig. 5; b, the foramen centrale; c, the yellow ring surrounding it; d e f, the place where the optic nerve perforates the sclerotic, the situation of the central vessels of the retina, improperly so called; g, b, c, three principal branches of these vessels, filled with blood.

Fig. 9.—A view of the retina and vitreous body, with the lens, seen from the front; it is the reverse of the preceding figure, exhibiting the anterior limits of the retina, the space between it and the lens, the anterior surface of the latter, and the foramen centrale, seen through the ciliary and vitreous bodies.

a b, the retina; c d b, its termination in front; c b, the corona ciliaris, formed by the membra e u aboleira round the
the edge of the lens, corresponding to the ciliary processes; 
$e d$, the lens; $d$, the foramen centrale; $e f$, vessels of the retina.

Fig. 10.—The outer surface of the retina in the left eye; 
a, b, its anterior margin; $b$, its central foramen; $b i$, blood-veins furrowing the latter; c $d$, the optic nerve, deprived of its involvements; e $f$, the corona ciliaris, not covered by the retina; $e f$, the distance of the ciliary body from the lens; $g$, remains of pigmentum nigrum; $k l$, the lens; $k$, the part projecting above the corona ciliaris.

Fig. 11.—The choroid coat of the left eye with the vessels injected; seen on the side towards the nodule.

$a b$, the optic nerve; $c f$, the remaining part of the sclerotic; $g w$, the tunica choroides; $b h m$, the annulus gangliiformis; $m$, the internal long ciliary artery; $n$, the internal long ciliary vein; $e l$, the internal long ciliary nerve; $p$, the long and short arteries of the choroid; $q r$, the ciliary nerves; $r$, a trunk of the vena vorticosa superior; $s$, a trunk of the vena vorticosa inferior; t, another of the same; $g b$, the margin which marks its separation from the iris.

Fig. 12.—The anterior surface of the choroid, and iris of the left eye, being a front view of the preceding figure.

$a b$, tunica choroides; $b e$, the annulus; $d g$, the iris; $a b$, the margin connected with the choroides; $e l$, the outer or larger ring; $c f$, the inner or lesser ring of the iris; $g$, the pupil; $d g$, the narrow side of the iris next the note; $g h b$, the broader side towards the temple; $m n$, ciliary nerves, forming plexuses on the annulus; $r$, the external long ciliary artery; $s$, the internal long ciliary artery.

Fig. 13.—A view of the chrysalid lens of a child newly born, showing its rounded form.

Fig. 14.—The lens of a child of six years old, increased in circumference, not in thicknesses.

Fig. 15.—A side view of the lens of an adult. The difference between the anterior and posterior segments is less than in either of the preceding.

Plate IV.

Fig. 1.—A fragment of the choroides and iris of a newborn child, seen on its internal surface, magnified twenty-five times. The vessels are filled with injection.

$e l$, the true size of this segment; $b g$, the part belonging to the iris; $e f$, the margin of the pupil; $g$, the margin next to the circumference of the cornea; $b r$, part of the inner margin of the iris; $b h$, trunks of blood-vessels supplying this network; $d g$, part of the greater or outer ring. The difference in the distribution of the vessels on these is very evident; $i, k, l$, three larger arteries arising from the circle formed by the long ciliary vessels round the iris; $m, n, o, p$, three entire pieces or folds; $m, q$, two segments of folds; $r v$, the projecting margin of the fold, which dips into a corresponding depression in the vitreous body; $s o$, a deeper part of the margin, where the piece joins each other; $x a, y$, a flattened part of the choroides between the ciliary body or processes, and the anterior margin of the retina, seen in Plate III. fig. 5; $x y z$, part of the choroid corresponding to the retina; $x y$, that opposite the termination of the retina; $z$, trunks of the vena vorticosa.

Fig. 2.—The anterior part of the choroides, with the iris, and membrane pupillaris, in a fetus of seven months, magnified quadruply, and the vessels filled with injection.

$e l$, the true size of this segment; $a b$, the proper choroid of the bulb; $e f$, the annulus gangliiformis; $e d$, the iris; $d e$, the membrane pupillaris, its vessels continuous with those of the iris; $f$, the long internal ciliary artery; $g$, the long external artery. These arteries, by their divisions, form a ring round the iris; $i, r$, five venous vortices in the choroid.

Fig. 3.—The posterior part of the chrysalid lens, enclosed in its capsule, from a fetus of seven months, with the vessels injected, magnified to four times its natural size.

$A$, the true size of the lens; $b$, a blood-vein from the central artery of the retina, which has passed through the middle of the vitreous humour, and is scattered over the capsule.

Figs. 4 and 5.—Views of the left eye, after a plane perpendicular section passing antero-porteriorly through the orbit, and the parts it contains, dividing them into two equal portions, an internal and external, the former of which is here represented. Every part is seen in its natural situation, nothing having been disturbed or removed. The explanations are given in the following plate, where the figure is magnified to three times its natural diameter, in order to avoid confusion, and express the objects more distinctly. In Fig. 4, the eye is shut; in Fig. 5, it is open. Some parts also which were exhibited in Fig. 4, having been removed, others are brought into view in Fig. 5. In Fig. 5, we observe the fold of the upper lid, and the eyelids passing under the fold back into the orbit. The retina and lens being removed, the choroid is brought into view, with its ciliary processes, vena vorticosa, and long internal ciliary artery. It shews also the situation of the central artery of the retina.

Plate V.

A magnified outline of Fig. 4. of the preceding plate. As this is a most important view, the references are given very fully. The words “cut surface” should be understood throughout; they are omitted to avoid the tedious repetition of the same phrase.

$A$, the bony orbit; $A-H$, the upper plate of the orbit; $A B$, the smooth surface towards the eye; $C C G H$, the convex surface, uneven, corresponding to the brain; $A D E F$, the frontal part of the os frontis; $C C G$, the orbital part of the os frontis; $E E$, the medullary cells of the frontal part; $F$, the left frontal sinus; $P F$, the medullary cells of the orbital part; $G$, the future between the frontal and sphenoidal bones; $G B H$, a part of the upper or lesser ala of the sphenoidal bone, which forms the upper part of the canal for the optic nerve; $Q-M$, the inferior plate of the orbit; $I I$, the superior maxilla; $K L$, the orbital fissure occupied by tendinous fibres, fat, vessels, and nerves; $M$, part of the lesser ala of the sphenoidal bone, forming the lower part of the foramen opticum; $L$, the perioleum; $B H M$, the canal in the ala minor of the sphenoidal bone for the optic nerve, or foramen opticum; $N$, the perioleum of the frontal bone; $O$, a continuation of the perioleum towards the upper lid, forming a kind of ligamentous arch, the ligament of the superior tarsus; $P$, the perioleum of the superior maxilla; $Q$, a continuation of this perioleum, towards the lower lid, in the form of an arch, the ligament of the inferior tarsus; $T$, the axis of the orbit; $R V$, the dura mater; $R$, the external, $S$, the internal layer; $T U V$, the place where the dura mater is united partly with the perioleum of the orbit; $T$, partly with the sheath of the optic nerve. $U$, partly with the origin of the levator palpeabrae; $V$, the rectus superior; $W-Z$, the forehead; $W$, the thickness of the skin of the forehead; $X$, the fat between the skin and the frontalis; $Y$, the frontalis; $Z$, the fat between the frontalis and the perioleum of the frontal bone.

$A-d$, the brow, or superciliun; $n$, corrugator supercilii;
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cilli; b, mouth of the frontal vein; c, mouth of the frontal artery; d, hairs of the eye-brow; e, ex, the upper eye-lid; f, thin; g, fat beneath the skin and orbicularis, gradually disappearing towards the eye; h, orbicularis palpebrarum; i, fat beneath the orbicularis, terminating in a thin edge above; j, the tendon of the levator palpebra superioris; k, cellular tissue between it and the conjunctiva; l, the cartilage of the upper lid; m, marks of the lacrimal points; r, s, conjunctiva of the upper lid; r, where it invests the cartilage and lacrimal glands; r, s, where it is connected with the tendon by cellular tissue; r, s, where it becomes reflected on itself; r, s, where it is spread over the globe of the eye; r, s, the superior barba, or fold of the conjunctiva; k, e, the space between the two layers, represented by the black line, as the two surfaces are in contact of q, the margin of the upper lid; g, the part where the skin of the face becomes inflected, and continued into conjunctiva; n, the cilia or eye-lashes of the upper lid; n, the opening of the coronary artery of the upper lid.
a—g, the lower eye-lid; a, skin; b, fat beneath it; c, orbicularis; d, fat under the orbicularis; e, r, cartilage of the lower lid; f, g, h, margin of the lower lid; b, a groove between the two edges; j, triangular hollow left between the edges of the eye-lids, and the eye-ball, when shut; k—n, conjunctiva of the lower lid, disposed as in the upper; l, m, the inferior barba of the conjunctiva; j, lower eye-lash; g, a quadrangular space between the cilia and the margins of the eye-lids.

1—11, muscles of the eye; 1, 2, 3, levator palpebra superioris; 4, 5, 6, rectus oculi superior; 7, 8, 9, rectus inferior; 10, the tendon of the obliquus superior; 11, the fleshy part of the obliquus inferior.

12—18, the optic nerve, curved, somewhat like an italic f; 12, 13, the sheath of the optic nerve; 12, its internal, 13, its external layer; 14, the thin membrane immediately investing it; 15, the fibres of the nerve cut and exposed; 16, part of the nerve as it passes the bony canal, appearing compressed from above below; 18, the contracted extremity of the nerve in the sclerotica; 19, the principal trunk of the ophthalmic artery; 20, the principal trunk of the ophthalmic vein; 21, some branches of the nerve of the fifth pair.

22—43, the bulb of the eye; 22, 22, the axis of the bulb; 23, the greatest transverse diameter of the bulb; 24—26, the cornea; 25—26, the space between the cornea and lens, divided into the anterior chamber, 25; and the posterior chamber, 26; 24, r, and 24, r, a double groove between the cornea and sclerotica; 27—29, the sclerotica; 27, its anterior limit, with the double groove, to which the annulus of the choroid is firmly fixed, 32; 28, the thinnest part of the sclerotica; 30, the pigmentum nigrum between the sclerotica and choridea; 31—37, tunic chloroides; 32, 33, the annulus ganglionis; 34, 35, ciliary processes; 34, 39, 39, part of the choroid not covered by retina, and which is generally of greater brightness than the rest; 36, 37, the iris; 36, the margin by which it adheres to the annulus and ciliary processes; 37, 26, the margin of the pupil; 38, pigmentum nigrum between the choroides and retina; 39, 40, 41, the retina. Its anterior termination pointed out by the line 39, 40, 41, 40, 40, the ciliary line; 41, 42, the long diameter; 44, 45, the short diameter; 44, 44, its anterior convexity; 44, 45, its posterior convexity; 46, 26, the capsule of the lens; 34, 42, the distance of the lens from the ciliary body.

In this outline the forms and proportions of the several parts are preserved with the most scrupulous exactness, so that any calculations made from it will be found correctly.

Physiology of the eye.—To estimate correctly the powers of the eye requires an acquaintance with the nature of light, and with the laws by which it is regulated; an exact knowledge of the organ; and of the forms, proportions, densities, refractive and dispersive powers of the transparent parts, as well as of the radii of their curvatures. Since many of these points are hitherto but imperfectly elucidated, we cannot expect to determine the functions of the eye accurately in all their detail. Generally, indeed, in investigating this delicate organ, the mathematicians have been deficient in correct anatomical knowledge; while anatomists have been unacquainted with the science and with the method of calculating accurately the results of their observations.

Experiment and calculation prove that the luminous rays proceeding from any object to the eye undergo certain changes in their passage through the transparent parts of the organ; that these changes ultimately collect the rays, proceeding from the several points of the object, into opposite corresponding focal, or nearly focal points on the retina; and that the impression thus produced causes the perception of the object. A simple but interesting experiment will prove the point. Let an eye, from which the back of the sclerotica and choroid have been carefully removed, and their place supplied by oiled paper, or by the membrane which lines the shell of an egg, be placed in a room with a single candle, with the convex side towards the luminous object. The image of the candle will be represented on the paper, diminished in size, and inverted. Without attempting to calculate precisely the refraction or dispersion of the rays in the different parts, we shall trace them from the anterior surface of the cornea to their collection into foci on the retina, giving the change of direction in general terms.

The pencils of rays radiating from any object, when they arrive at the surface of the cornea, form cones, the points of which are at the object, and the bases on the cornea. Those which impinge on the opaque sclerotica are reflected, and have no concern in the production of vision; and those which, falling very obliquely, make a very considerable angle with the cornea, are also reflected without penetrating into the aqueous humour. The rays, which fall within an angle of about 45 degrees, pass through this membrane, undergoing a certain refraction, by which they are brought nearer to the line of the axis of the cornea; and, if produced, would converge into a focal point beyond the bottom of the eye. From the cornea the rays pass into the aqueous humour. They are divided by the dispersive powers of this fluid, so that, if continued in the same medium, they would not only converge beyond the back of the eye, but on account of the aberration caused by their different refrangibility, would produce a confused and coloured image.

The rays collected by the cornea pass through the pupil. Those which come in an unfavourable direction are either reflected by the iris, or absorbed by the pigmentum on its posterior surface. The pupil admits only those rays which are the nearest to the axis of vision. They then meet with the chryalline, which, by its refractive powers, collects them, and brings them into focus, after passing through the lefs refractive medium of the vitreous humour on the concave surface of the retina.

They do not impart a correct perception of the body which reflects them, unless they fall on the retina precisely in the order in which they are detached from that body.
EYE.

To produce this effect, it is necessary that all the rays, which proceed from any one point, should be collected in one point of the retina; and that all the points of union thus formed should be disposed in the same manner as in the body, of which they form an image.

The cone of rays which proceeds from any luminous point to the cornea forms another cone, the apex of which falls on the retina. These two cones have their axes almost in a straight line. That which is perpendicular to the middle of the chryllalline proceeds directly to the bottom of the eye; that which comes from above falls inferiorly; that on the left proceeds to the right, and so on with respect to the others: thus an inverted image is formed on the retina.

Among the obvious advantages derived from the actual disposition of the several parts of the eye, we may remark, that the surface of the cornea only, if it had been more convex, could not have collected the lateral rays of a direct pencil to a perfect focus, without a different curvature near its edges; and then the oblique pencils would have been subjected to a greater aberration, nor could have been made to converge on any focus on the retina. A second refraction performs both these offices much more completely, and has also the advantage of admitting a greater quantity of light.

The iris, by altering the diameter of the pupil, in the manner we have already noticed, will influence immediately the quantity of light admitted into the eye. If one eye is closed, and we continue to look at the same object, the pupil of the open eye dilates evidently, and contracts again, as the other is opened, to its former diameter. The iris also intercepts such rays as would fall on parts incapable of refracting them regularly, or such as are directed obliquely on the cornea as to be too much refracted, admitting only the smaller pencil which enters the eye more in the direction of its axis. This reasoning applies, however, but partially, and only in cases where the opening of the pupil is circular, and where the confusion which would arise from the aberration of the extreme lateral rays may possibly be prevented: it will not hold good where the opening is very much extended below the horizontal and, in some circumstances, almost linear, as in the cat. The eccentricity of the pupil mentioned in the description of the iris can only so far influence the pencils of rays as to make them fall on the anterior vertex of the chryllalline, with which it corresponds; the axes of the pupil, and the lens, do not correspond with that of the cornea. From observing that the pupil changes, when objects are brought nearer to or removed farther from the eye, physiologists have fancied that alterations in its diameter are the principal means of adjusting the organ to different distances. But it has appeared from careful experiments that this contraction and dilatation are irregular and limited; that by bringing the object nearer to the eye, within a certain distance, the pupil not only ceases to contract, but becomes again dilated; and, that beyond a few yards distance, it also ceases to dilate. In viewing the sun, instead of dilating according to the distance, it contracts most closely, obeying the quantity and intensity of the light, rather than the distance of the object. In viewing a less luminous object, the pupil dilates, when it is more distant, a greater quantity of light being necessary to produce a clear impression; as the object is brought nearer, we require a less degree of light, and the iris contracts to exclude what is superfluous. Thus far the iris may be useful in accommodating the eye to different distances; it may regulate the quantity of light, but it cannot alter the direction. In quickset vision, the pupil preserves its diameter with headsets, when the proportion of light necessary to be admitted is once determined. By its contraction, when a nearer object is viewed, it lessens the confusion which would arise, in such eyes as cannot accommodate themselves sufficiently by powers hereafter to be examined, from the magnitude of the imperfect focal points on the retina.

Some inflection of the rays may have place in passing the edge of the pupil; but its great mobility, the width of the opening, and its very small distance from the chryllalline, prevent any apparent confusion. Where from any cause the opening is very narrow, and the iris has lost little motion, a confusion may certainly take place from this cause.

The alterations of the pupil accommodate the eye to various states of disease, by regulating the quantity of light. When a great number of rays would occasion pain in an inflamed organ, the contraction of the aperture excludes the light, while a proportionate enlargement of the pupil provides against the inconveniences of diminished sensibility, by admitting the greatest quantity of rays.

As the chryllalline lens dilates in density gradually in every direction, approaching the vitreous humour on one side, and the aqueous on the other, Mr. Ramsden supposes that its refractive power must be the same with that of the two contiguous substances. Its principal use appeared to him to be that of correcting the aberration arising from the spherical figure of the cornea, where the principal part of the refraction takes place. From the constitution of the chryllalline he inferred, that it will refract the rays of light without reflecting any of them; so that, although we have two surfaces of the aqueous, two of the chryllalline, and two of the vitreous humour, we have only one reflected image, and that being from the front of the cornea, there can be no surface to reflect it back, and dilute the image on the retina. If the surfaces of the chryllalline had been abrupt, there must have been a reflection at each, and an apparent haziness would have interfered with the distinct view of every luminous object. The smaller density of the lateral parts will not only correct the aberration of the spherical surface of the cornea, but will cause also the focus of each oblique pencil of rays to fall either accurately, or very nearly so, on the concave surface of the corneal, throughout its extent. Had the refractive power been uniform throughout the whole substance of the lens, it might have collected the lateral rays of a direct pencil nearly as well, but it would have been less adapted to the oblique pencils of rays. Alto, the gradual increase of density in approaching the centre makes the chryllalline equivalent to a much more refractive subsidence of equal magnitude.

The principal use of the vitreous humour appears to be that of giving a ready passage to the rays of light, as they are converging into focus on the retina, and of keeping at the same time the surface of the latter uniformly spherical. It would allow a charge of figure in the eye, or in the lens, or even a change of place in the latter, supposing there were powers in the living organ adequate to the purpose.

Some have conceived that the retina is not equally sensible in all parts; and that a certain portion only, near the axis of the eye, is capable of conveying distinct impressions of minute objects. Comparatii says that distinct vision is effected only in the optic axis, which is moved most rapidly over every point of the object; and that what is seen apparently out of the axis is caused by the direction of the first impression in the axis. We believe, however, that the limits of distinct vision are far more extensive. Dr. Young, speaking of his own eye, says, that the visual axis being fixed in any direction, he can see at the same time a limb
ous object placed at considerable distances from it; the angle, however, differs. Upwards it extends to 50 degrees, inwards to 60, downwards to 70, and outwards to 90 degrees. These internal limits of the field of view nearly correspond with the external limits formed by the different parts of the face, when the eye is directed forwards and somewhat downwards, which is its most natural position; and both are well calculated for enabling us to perceive the most readily such objects as are the most likely to concern us. The extent of the retina is every way greater than the limits of the field of view. The whole extent of perfect vision is little more than the aggregate of the immediate field of view; speaking, the imperfection begins within a degree or two of the visual axis, and at the distance of five or six degrees becomes nearly stationary, until, at a still greater distance, vision is wholly extinguished. The imperfection may be owing partly to the unavoidable aberration of oblique rays, but principally to the insensibility of the retina; for, if the image of the sun itself be received on a part of the retina remote from the axis, the impression will not be sufficiently strong to form a permanent impression, although an object of very moderate brightness will produce this effect, when distinctly viewed. The motion of the eye has a range of about 55 degrees in every direction, so that the field of perfect vision, in succession, is by this motion extended to 110 degrees.

It appears from some experiments of Haldar's, made by producing an artificial strabismus, that the opinion, which limits the position in which an image can be seen distinctly to a point at the bottom of the eye, is by no means reconcilable with actual observation. For, in an artificial strabismus, one of the impressions falling on a part without the visual axis, ought not to produce any perception of the object; this we know not to be the case. From this fact alone we may conclude that the place of the image is not necessarily confined to the axis, but that many points of the surface of the retina are capable of conveying an impression of it. As the angle is increased, the perfection of the image may be heightened; but we do not lose the perception of it until its position is such, that none of the rays proceeding from it directly can be brought to converge on the posterior hemisphere of the globe. This would appear to conform also with our ideas of the use of the extent of the retina, for which, if the field of vision was so extremely limited, we could assign no reason. The points of it, at a distance from the axis, may be less favourably disposed, but are not perhaps less incapable of being affected. "The whole of the retina is of such a form as to receive the most perfect image on every part of its surface, that the state of each refracted pencil will admit; and the varying density of the crystalline renders that state more capable of delineating such a picture than any other imaginable contrivance could have done." To illustrate this, Dr. Young has given an excellent diagram, representing the successive images of a distant object filling the whole extent of view, as they would be formed by the successive refractions of the different surfaces. In opposition to the observations given above respecting the decreasing sensibility of the retina remarked by Dr. Young, it has been observed by others, that, on comparing the impressions produced by rays parallel to the optic axis with those by rays much inclined to this axis, they have appeared to differ in intensity only in a degree corresponding to the diminution in the extent of the opening of the pupil, produced by the obliquity of its plane to the luminous rays, and by the obliquity of the rays themselves to the refracting substances through which they pass. At the nod, the difference of the clearness of the impression is not such as it would be, if it depended on a diminution of the sensibility of the retina, proportionate to its distance from the optic axis. Notwithstanding the influence of the causes just mentioned, the light of a candle passing into both eyes, when their axes are artificially inclined, so that the images make angles of 15 to 25 degrees with the optic axis, suffers no apparent diminution of brightness. This fact certainly gives to the field of distinct vision a more considerable extent than that usually allotted it. The point of the retina, which corresponds to the optic axis, may possibly be the place of most perfect vision; not because it is endowed with a greater sensibility than other parts of the retina, but from its being in the exact focus of the refractive powers of the eye, and the only point where the image can be impressed with every perfection.

In considering the sensibility of the retina, the effects of the pigmentum must not be overlooked. In the human subject the pigment varies in colour; but is always more or less dark. In animals, where the pigmentum is more than one colour in the same eye, the lighter portion is always placed at the bottom of the eye, including the entrance of the optic nerve in its sweep; the colour varies in different animals, but has always a brilliant surface. Probably the light has a greater effect on the retina, in eyes which have a white pigmentum, than in such as possess a dark one. However all animals see more or less distinctly in the dark, according as their lidum tapetum approaches nearer to a white or black colour. Man, in whom it is dark, sees very imperfectly in a light where a cat, or dog, would perceive objects with tolerable clearness. We may observe, that when either of the latter look at us in the dark, the whole pupil is enlarged and illuminated; but in a full light there is no such appearance. Here there must be a reflection of light from the bottom of the eye to produce the effect; and the reflected light is always of the same colour with the tapetum. Thioe individuals of our species who have a light pigmentum, see much better with less light than those who have it dark. In the Albino, where the colouring matter is exceedingly thin, or wholly deficient, the common day-light is far too powerful to admit of distinct vision. When he attempts to examine the qualities of an object with precision, the eye-brows are knit, and the eyelids kept almost shut. In the twilight he can see more plainly, as the luminous rays are then not too intense for the very sensible retina. The serret is defined, from its mode of life, to see in dark places; and its pigmentum is naturally white.

The rays which pass through the transparent retina are disjosed of according to the reflecting powers of the pigmentum. In man, who requires distinct vision in a moderate light, rather than the power of seeing where light is almost wholly wanting, the pigmentum is dark, and the rays are absorbed, and entirely lost; therefore, in such eyes, it can add nothing to acuteness of vision, and a considerable quantity of light is required to produce an adequate impression on the retina. The rays are then lost in the pigmentum, and the accuracy of the image is no way impeded. In animals, who require a great acuteness of vision, the rays, reflected from a light and brilliant surface, again impairs the retina, and incrases the power of vision. The interval of time is too short, and the distance between the points they may strike in their double passage too minute, to occasion any indistinctness of the image.

Distinct vision requires that the object should be fixed, and not allowed to move over the surface of the retina. To accomplish this object, the muscles of the globe are employed in the manner above described. We believe the
impression made on the retina by the luminous rays to be in some degree permanent, and the more so as the light is stronger. The duration may vary probably from six-tenths of a second to nearly a second. Hence the well-known phenomenon of the circle of light in revolving a lighted stick. If the object is painelly bright, the sensation is more permanent, and vanishes at last gradually.

It is very difficult to ascertain the proportions of the eye, so exactly as to determine with certainty the magnitude of the image on the retina, as the situation, curvature, and constitution of the lens will make a very material difference in the result. It is proportionate to the magnitude and distance of the object, and is measured by the angle which each end of the object makes with the retina. The more remote therefore the object, the smaller the image, as it is included in a smaller angle; when the distance is so great as to put an end to distinct vision, we suppose the angle on the retina to be too acute to convey any precise idea of the size of the object. By ascertaining the least possible object that the eye is capable of discerning, we may thus form some conjecture as to the smallest possible image. The power varies no doubt in different individuals, and has been variously estimated. The eye of almost all persons can perceive distinctly two points subtending an angle of a minute; in some persons it can distinguish the difference of objects subtending an angle of 20 seconds. A single object, if bright, and at the proper distance for distinct vision, (about eight inches,) may be discerned, though not subtending an angle of two seconds and a half. Haller says even less than this. In the fiction of a gilded silver thread, the gold may be distinguished from the silver, when not exceeding tenth part of a line in thickness. According to the rule above-mentioned, the image of distinction in this case must form on the retina a point almost incommensurably small, and yet such is the sensibility of the latter, that the difference of the objects is accurately determinable. This far exceeds the common opinions concerning the powers of the eye in discerning minute objects.

Experiment has shown that there exists in the retina an insensible spot, about an inch in diameter; if the image falls on this, no perception is produced. Two pieces of white paper are fixed on a wall somewhat darkened, about level with the eyes, two feet distant from each other, the left eye is then shut, and the right eye directed upon the left object; if the observer moves slowly backwards, the object, although four inches in diameter, will disappear at the distance of nine or ten feet. The experiment may be made more simply with the two thumbs, or two candles. The latter are placed, say at ten inches from each other; at a distance of 16 feet, if the eye is directed to a point four feet to the right or left of the middle of the space between them, they are lost in a confused spot of light; but any inclination of the eye brings one or other of them into the field of view. The object is supposed to vanish, or become obscure, when it falls directly on the spot occupied by the entrance of the optic nerve. Different experimenters have varied in their estimate of the diameter of the insensible spot, from the fortieth part of an inch, to a seventh part of the diameter of the bulb; the first we believe to be too small, the last certainly too great. Since the discovery of the central fovea in the retina, a question has been started, whether the want of the retina at this spot does not account more satisfactorily for the vanishing of the object, than any supposed insensibility at the entrance of the optic nerve? The answer is, that the situation of this fovea in the retina does not correspond with the part opposed to the object, when rendered invisible; and that the entrance of the optic nerve is found to be precisely in the part opposite. The office itself is placed just at the end of the visual axis, and must, we should conceive, have some material office attached to it, and have a considerable effect on vision. The situation of the yellow ring around it appears by observation to be connected with the acuteness of the organ. Mr. Home says, "it is probably too small to produce any defect in vision;" that it produces no defect we readily admit, but that it is too small to influence vision, is not, we think, at all probable. Its use has not been as yet ascertained.

Blumenbach advances the following conjecture on this point. Man, and such animals as have the two eyes placed with the axis parallel, thereby gain the advantage of seeing objects with both eyes at once, and therefore more distinctly. But at the same time they are exposed to this inconvenience, that in a strong light both eyes become dazzled at once; and this happens so much the sooner, because the light falls on the corresponding principal foci of both eyes at once. This inconvenience seems to be obviated by the foramen centrale; since that part which forms the principal focus of the eye opens in a dazzling light, so as to form a kind of small pupil, through which the concentrated rays pass, and fall on the pigmentum beneath.

Since the images are pictured inverted on the retina, many disputes have arisen as to the cause of our perceiving the objects erect. If it be allowed that we judge of the situation of each luminous point by the direction of the rays it transmits, it follows, that we must fee bodies as we really do see them, in their proper position. The opinion that we really see objects reversed, and correct the sensation by experience and judgment, derived from the other senses, is liable to very numerous objections. The chick just hatched knows where to direct its bill; and persons born blind, who have suddenly gained their sight, see objects in their proper position. We do not see the picture on the retina, but the object itself in the direction of each of the rays which convey to us the sensation, or, to speak more correctly, in the direction of the axis of that pyramid, which a pencil of divergent rays forms in proceeding from any point of an object to the eye. Berkeley explains the supposed difficulty in another way; he does not allow that we can estimate the situation of parts or objects by the decussation and direction of the rays of light, as the mind neither perceives the interferences of the radian pencils, nor purports the impulses they give in right lines; without perceiving them it cannot form a judgment, and it cannot perceive them without a confusion of such perception. The situation of visible objects must be entirely relative, and depend on the place which they occupy with regard to each other. And as all visible objects are inverted at the same instant, each will be in the same relative situation on the retina as it is in actually. Thus the terms of above and below are arbitrary expressions, by which it is agreed to call upper, what corresponds to the heavens, and lower, what corresponds to the earth. Now it is evident, that at the bottom of the eye the situation of these is inverted, the earth is above, and the heavens below. We call that the lower end of an object which is nearer the ground; and the image of a man's feet, being in contact with the image of the earth on the retina, we naturally infer that they are in contact with the actual earth; the head being more remote from the earth, we suppose that it is higher. The confusion has arisen from mixing the ideas derived from the different sensations of light and touch. You say, (to use the words of Dr. Berkeley,) the picture of the man is inverted, and yet the appearance is erect. I ask you what mean you by the picture of the man, or which
is the same thing, the visible man's being inverted? You tell me, it is inverted because the heels are uppermost, and the head undermost. Explain this; you say, that by the head being undermost, you mean that it is nearest to the earth; and by the heels being uppermost, that they are furthest from the earth. I ask again, what earth you mean? You cannot mean the earth that is painted on the eye, or the visible earth; for the picture of the head is furthest from the picture of the earth, and the picture of the feet nearest to the picture of the earth; and accordingly the visible head is furthest from the visible earth, and the visible feet nearest to it. It remains therefore that you mean the tangible earth, and so determine the situation of visible things with respect to tangible things, which is absurd, and perfectly unintelligible. The two distinct provinces of sight and touch should be considered apart, and as if their objects had no interconnexion, no manner of relation to one another, in point of distance or position.

Two distinct images are painted, one upon each eye, and yet we only perceive a single object. Many very different explanations have been given of this phenomenon; the most satisfactory is, that in the two eyes there are corresponding parts of the retina which are probably incapable of the same impression in equal degree, and convey it to the fenso-rium in that equal degree; hence, as long as similar points of the images fall upon the corresponding points of the retina, the perception of the same object is single. It is double for the same reason whenever the disposition of the visual axes is deranged. Every object which produces two distinct images on the retina is necessarily placed at the point of intersection of the optical, or visual axes, and is painted consequent on corresponding points of the retina. By an artificial prelude on one of the eyes we may displace its visual axis, or point of most perfect vision, that the two images shall not fall on those parts of the retina of the two eyes usually impressed simultaneously; a single image is the consequence. The optical axes are far nearly parallel to each other, that: they naturally meet at a great distance; but, in order to preserve the simplicity of the perception, when we look at an object brought nearer to us, we make them converge towards it by means of the external muscles of the eye, which is further adjusted to the decreasing distance by some other of its powers, so as to convey a single and distinct image of the object. This operation is confirmed by some observations of Mr. Home's on double vision as the consequence of a want of correspondance, produced by some change in the refracting media of one of the eyes, or else by a want of similar actions in the muscles of both eyes respectively. The former takes place after the chrysalidine lens has been extracted, and the convex lens made use of to produce the requisite focal adjustment is not properly placed. Yet, when objects are in rapid motion, or when brought very much nearer to the eye than the point of distinct vision, may not the impressions be made on points not exactly symmetrical, or in the visual axis, without producing double vision? It appears from experiments that it is not absolutely necessary that objects should fall on the visual axis in order to produce single vision, but that there are many points at different distances from the axis on which, if the images fall, they will appear but as one. In the transverse plane the optical axes must be much inclined (about 15 degrees), in order to produce a double image; in the vertical, a very slight inclination is sufficient to cause it. It is inferred from these experiments, that the limits of the field of single vision, or of the area of the points of correspondance, will form an ellipse, of which the long axis corresponds to the transverse axis of the globe, and the short to the vertical axis: the slit of these is about three lines and a half in length, the last scarcely one. It has been a matter of doubt, how far the judgment is concerned in the perception of the single image. Objects appear single, it is said, although there is a double image, because the touch which corrects the impression produced by vision teaches us that the same object we see double is actually single. Experience and custom have so well established our judgment, from these two sensations, that we cannot derange it by the will. An argument against this is, that in cases where persons born blind have obtained their sight, the object is at once seen single.

As double vision is produced by a moderate derangement of the optic axes, squinting is produced by a much greater derangement. It does not follow that the squinting person sees every object double, for the apparent improper direction of the eye may be owing to the unequal situation of the parts of the eye, so that the image may yet fall as corresponding parts of the retina. The more probable explanation is, that the object is not seen by both eyes; but that one eye, more or less perfect, is directed to the object; while the other, which in such cases is imperfect, is drawn aside by habit, in order that its operation may not disturb the impression received by the other eye. The greater strength, shortness, and slant of the rectus internus muscle, may be the reason that the deviation is made towards the nose. Squinting takes place in three different circumstances; when one eye has only an indistinct vision; where both eyes are capable of seeing objects, but the one is less perfect than the other; and where the muscles of one eye have, from practice, as in the case of frequently looking through telescopes, acquired a power of moving it independently of the other.

The superiority of vision with one eye over that with two has been the subject of many discussions. It is commonly supposed that the first produces the most distinct perception; the opinion, however, is not correct. If we place a sheet of white paper directly before the eyes, and bring any opaque body, a book for instance, before the right eye, so that half the paper is concealed from it, while the whole is visible to the left; on regarding the surface alternately with one, or both eyes, we may observe distinctly that the part visible to both eyes is brighter and clearer than that which is visible only to the left; the first is the usual white thing, the last is obscured by a light shade. The superiority of telescopes with two eye glasses, over those with one, is universally acknowledged. In vision, with two eyes, therefore, we believe the impression to be stronger, the sensation more vivid, and the perception clearer; not doubly so as the impression is, because we can with difficulty diminish coincident similar impressions. If we look at any object through fluids of two different colours placed one before each eye, the object will appear of the colour resulting from the mechanical mixture of the two employed. If the colours were yellow and red, the perception would be as from orange, &c.; proving that a double impression produces in this case a compound or mixed sensation, from which a simple perception arises. There are many other phenomena attendant on the separate vision of different objects producing different combinations of them, which our limits will not allow us to discuss. The reader will find this subject very amply considered by Dr. Haldat in the Journal de Physique, t. 69, and illustrated by numerous apparently accurate experiments. The conclusion to be drawn from them is, that in many circumstances vision with both eyes will produce a simple perception, an apparent combination of objects varying in colour and form when they are viewed separately by each eye. And that objects
The image of the object is supposed to be painted on the retina, free from any prismatic colours produced by the different refrangibility of the rays, which might render it confounded. The transparent parts of the eye are disposed so as to correct the alteration of the visual rays, and to prevent their final dispersion. These effects are principally effected by the curvatures and constitution of the chrysaline already infilled on, which produce the same effect that in an achromatic object glafs we obtain in a lens perfect manner, by proportioning the radii of curvature of different lenses on the eye; it has been generally supposed that the correction is perfect, the regular diminution of the density of the chrysaline, redressing the errors caused by the cornea and aqueous humour. The perfection of the achromatic powers of the eye has been called in question by many able men, especially in consequence of experiments related by Malfkyne, Comparetti, and Dr. Young. Dr. Malfkyne, by calculating the refractions of the mean, molten, and least refrangible rays at the several humours of the eye, inferred a diffusion of the rays, proceeding from a point in an object, at their falling on the retina. The circle of disfpiration, however, would be too small to occasion any confusion; and he shews that the picture of objects on the retina is relatively, if not absolutely, perfect, and fitted for every useful purpose.

The experiments and observations of Comparetti are ingenious; he supposes that the chrysaline lens cannot, under all circumstances, correct the dispersion of the rays, although he conceives it to be susceptible of certain alterations of position directed solely to that purpose. His experiments are too numerous, and complicated to be introduced here in any shape. He proves, perhaps, a slight imperfection, under certain circumstances. Dr. Young does not think that the structure of the chrysaline, or any other provision, has the effect of rendering the eye perfectly achromatic. He addresses the colour bordering the image of an object seen indistinctly; the colours perceived on viewing an object through small openings, such as those of his spectroscope, and the following experiment mentioned by Dr. Wollaston. He looks through a prism at a small lucid point, which of course becomes a linear spectroscope. But the eye cannot so adapt itself as to make the whole spectroscope appear a line; for if the focus be adapted to collect the red rays to a point, the blue will be too much refracted, and expand into a surface; and the reverse will appear if the eye be adapted to the blue rays; so that in either case the line will be seen as a triangular space. He concludes also by another experiment, that the red rays, from a point of twelve inches distance, are as much refracted as white or yellow light, at eleven. The inference is, that the eye is not capable of uniting at the same point all the elementary colours of light. These observations have been examined with much ingenuity by Halley, who draws from them arguments highly in favour of the achromatic powers of the eye. The slight appearances of the decomposition of light at the edges of minute bodies are not owing to any inequality in the refractive powers of the eye on the different rays; but to the attraction which these bodies have for the luminous rays, which strike on their surfaces, after being reflected from the plane on which these small bodies are placed. When placed on a black wall, or table, no reflection takes place, and no colours are visible at their edges. It is evident, that if differently coloured rays are unequally refracted by the eye, spots of different colours should produce penumbrae of unequal extents, proportionate to the refrangibility of the rays they may reflect. But circular pieces of card, equal in size, and about a line and a half in diameter, painted red, yellow, blue, green, viewed on black, or white walls, at equal distances, and at the same time, offer penumbrae of equal extents. The colours observed on viewing objects through the spectroscope is caused by the luminous rays, by which we perceive them, being necessarily acted on by the narrow opening through which they pass; and no further decomposition of the light takes place than can be readily accounted for by principles well established in optics. If this were not the case, why should the eye be supposed to decompose rays which come through narrow apertures, and not those which arrive without any external obstacle to their natural radiation? In bodies seen indistinctly, the rays which chance on their margins are decomposed; and this diffusion, not visible at a distance from the entrance with the unsplit rays which are in the greatest number, is plainly seen when the object is brought close, because they arrive at the retina almost without any intermixture. The colours, therefore, seen at the edges of such bodies, do not arise from any supposed imperfection in the refractive powers of the eye, when the object is brought close to it. In order to draw a conclusion that the humours of the eye are not achromatic, luminous rays should be brought to bear on them, such as they are when radiating from a luminous body, and without undergoing any decomposition in their passage from causes external to the eye; it should then be proved that they undergo a decomposition in passing through the humours, and that this diffusion cannot be corrected. In the case of the prism, the separated rays may appear to be refracted unequally, because the spectrum is not linear in its whole extent. But on account of this very extent, they arrive at the transparent cornea with different inclinations, in unequal proportions, and impinge on a refracting medium, the curvature and density of which are unequal: we cannot therefore expect an equal refraction. The eye is capable of perceiving the natural mixture of the elementary rays which arrive at its surface; its not having the power of recomposing those rays, which artificial external causes have dispersed, is not sufficient to induce us to conclude that its achromatic powers are not perfect. The perfection of the achromacy of the eye is further proved, by there being no diminution whatever in the distinctness of the image, when, by an artificial dilatation of the pupil, by means of belladonna, the anterior surface of the chrysaline is almost wholly exposed. Again, when the greatest possible inclination has been given to the rays, no colour is perceptible.

The luminous rays, which arrive at the eye from an object at some little distance, will unite into a focus at a certain distance behind the chrysaline lens. Rays, which pass from an object closer to the eye, as they diverge more considerably, will unite into a focal point at a greater distance behind the chrysaline, and indistinct vision would be the necessary consequence, if the eye had not the power either of disengaging its axis, or shortening its focal distance; so that in these very opposite conditions the rays should converge equally into a point on the retina. This power of adjustment to distance is one of the most important to the perfection of the organ, and has excited the attention of every writer on the mechanism of vision; all allowing that some change must be produced, but few agreeing as to its nature or mode. The subject has been particularly agitated in this country, and has called forth many excellent observations on the mechanism of vision, which, if they have not finally proved the means by which the accommodation is brought about, have, at last, proved the fallacy of most of the theories adopted to account for it. To us, Dr.
Dr. Young’s opinion, of the change of the focal distance by some alteration in figure of the chryalline, appears the moll satisfactorily, and supported by the moll decisive proofs; the manner in which this alteration is affected, is a point not perhaps as yet demonstrated, however conclusive the arguments may be in favour of such alteration actually occurring. There is a certain point at different distances in different persons, from which luminous rays, passing to the eye, will be brought to a focal point on the retina, without any apparent exertion of any part of the organ. This is called the point of perfect indulgent vision. In persons who are near-sighted, or in whom this point is pretty close to the eye, owing to the too great refractive powers of the organ, the rays from objects at a moderate distance are brought to a focus at a point anterior to the surface of the retina. In such cases the divergence of the rays is increased, by means of a concave lens, and a confusion of the image is prevented. In those who are long sighted, where this point is at a greater distance, the rays from near objects cannot be brought to focal points soon enough to impress a distinct image, and the defect depends on causes of those which produce the myopic or near-sighted eye. It is remedied by a convex lens. We perceive, however, in the perfect eye, the power of focusing distinctly objects much nearer to the eye than this supposed point of distinct vision; and this exists in very different degrees in different individuals. It is equally true, on the other side, that we cannot, by any volition, accommodate the eye to view objects at a distance greater than that of indulgent vision, a circumstance easily experienced by any one. In the year 1793 Dr. Young made some observations on the curvature of the eye, and its provisions for adjustment, among which are accounts of the theories of adjustment, propounded by various earlier writers. Of these we shall say nothing, as a reference to the anatomical description of the eye, and other remarks already detailed, would at once refute the greater part of them. It was the opinion of Dr. Young that rays of light, passing from objects at a small distance, could only be brought to focus on the retina by a nearer approach of the chryalline to a spherical form: this change, he believed, was effected by the muscularity of the lens. In the following year, some observations of John Hunter on this subject were published by Mr. Home, from which it appears, that he had for many years entertained a notion, that the chryalline humour was enabled, by its own internal actions, to adjust itself, so as to adapt the eye to different distances. Mr. Hunter had instituted some experiments, but died before he had made sufficient progress to draw any conclusion. In the same year, Dr. Hotfiek, in a paper on vision, controverts Dr. Young’s deductions with regard to the muscularity of the lens, and attributes the effects produced in adjustment to the actions of the muscles. He adjoins, as the necessary concomitant of contraction in these muscles, that the axis of the eye will be elongated, and the elastic cornea rendered more convex: both which circumstances would tend to preserve distinctness of vision with regard to near objects. In order to prove that the eye is capable of having its focal adjustment considerably varied by external pressure, he applied the common spectacles to his own eye, and by increasing the pressure of it considerably, was enabled to see objects distinctly, though placed much nearer than the natural focal distance. The means here made use of to ascertain the fact do not appear to us very accurate. In the Croonian lecture for 1795, Mr. Home relates a series of experiments and observations made by himself and Mr. Ramfden, from which he concludes, that the eye has a power of adjusting itself to different distances, when deprived of the chryalline lens; and that, therefore, the supposed fibres, and laminated structure of that lens, is not intended to alter its form, but to prevent refractions in the passage of the rays through the surfaces of media of different densities, and to correct spherical aberrations; that the cornea is elastic, capable of being elongated a third of its diameter; that the tendons of the four straight muscles terminate in forming a lamina of the cornea; and, that in changing the focus of the eye from seeing with parallel rays to a near distance, there is a visible alteration produced in the figure of the cornea, rendering it more convex; and when the eye is again adapted to parallel rays, the alteration by which the cornea is brought back to its former state is equally visible. The exertion required to adjust the eye to near distances, and the ease with which it is adapted to remote objects, proves that the first was a positive action, and the second a relief. The defect of elasticity in the cornea, inferred to arise from age, is applied to explain the changes of vision which take place in advanced life. By some further experiments Mr. Ramfden and Mr. Home were induced to abandon the opinion that the adjustment is produced solely by the alteration of the convexity of the cornea, which might probably be sufficient when the lens was removed, but not when the eye is entire. Mr. Home assumes that the action of the straight muscles will elongate also the axis of the eye, and produce an effect upon the chryalline lens, and chryalline processes, pushing them forward in proportion as the cornea is stretched. Granting these effects, Mr. Ramfden computed that the increase of the curvature of the cornea may be capable of producing one-third of the effect, and that the change of place of the lens, and elongation of the axis of vision, sufficiently account for the second two-thirds of the quantity of adjustment necessary to make up the whole. We must here observe, that it is not yet demonstrated that the actions of the straight muscles can produce the effect ascribed to them. They have been supposed by others to flatten the eye, and shorten its axis, upon arguments equally plausible. We believe they have but little effect, except that of directing the axis of the eye to the object, and doubt if they can exert any prejure on the globe. Neither is it ascertained what effect such pressure would have in elongating the axis, pulling forwards the lens, or increasing the curvature of the cornea. The opinion that the chryalline lens is moved forward by the action of the chryalline processes, is equally gratuitous. In the year 1820 was published an excellent paper by Dr. Young, on the mechanism of the eye, in which he examines, with great sentences and accuracy, the different opinions on this subject. It is impossible to give an abstract of his observation; in the compass of this article; we must refer the reader to the paper itself, for the detail of all the proofs by which he endeavours to establish his opinion of an alteration in the figure of the chryalline, and give here only the general conclusions drawn from his investigations. "The arguments in favour of an increase of the convexity of the chryalline lens are of two kinds; some of them are negative, derived from the impossibility of imagining any other mode of performing the accommodation, without exceeding the limits of the actual dimensions of the eye, and from the examination of the eye in its different states by several tests, capable of detecting any other changes if they had existed: for example, by the application of water to the cornea, which completely removes the effects of its convexity, without impairing the power of altering the focus, and by holding the eye, when turned inwards, in such a manner as to render any material alteration of its length utterly impossible. Other arguments are deduced from positive evidence of the change
change of form of the chrysalis, familiarized with the particular effects of refraction and aberration, which are observable in the different flates of the eye; effects which furnish a direct proof that the figure of the lens must vary; its surfaces, which are nearly spherical, in the quiescent form of the lens, assuming a different determinable curvature, when it is called into exertion. The objections which have been made to this conclusion are founded only on the appearance of a slight alteration of focal length in an eye from which the chrysalis has been extracted; but the fact is neither sufficiently ascertained, nor was the apparent change at all considerable; and even if it were proved that an eye without the lens is capable of a certain small alteration, it would by no means follow that it could undergo a change, five times, or ten times as great.

The means whereby we are enabled, by sight, to determine the distance, magnitude, and situation of objects have not been sufficiently explained to allow us to speak with confidence. It is acknowledged that the estimate which we make of the distance of objects considerably remote, is rather an act of judgment grounded on experience than of sense. When we perceive a great number of intermediate objects, which we have experienced to take up a considerable space, we conclude that the object we see beyond them is at a great distance. When an object appears faint and small, which at a near distance we have experienced to make a strong and large appearance, we conclude it also to be far off. It is supposed by some that when an object is so near that the interval between the eyes bears any sensible proportion to it, the two optic axes meeting at the object, make a sensible angle, by means of which, according as it is greater or smaller, the object is perceived to be nearer or further off. This does not depend on judgment formed from experience, but resultst from a supposed necessary connection between the idea of an obtuse angle and a near distance, and an acute angle and a farther distance. There is another way mentioned by others, by which we are said to perceive distances when we look only with one eye. And that is, the greater or less divergency of the rays which fall on the eye, that point being judged nearest which is seen by the most diverging rays, the apparent distance increasing as the divergency of the rays decreases, until the distance is to great that the rays which fall on the eye are to feene parallel. This mode of judging is not derived from experience, but from the difference of angular impressions made by diverging and nearly parallel rays; it being a certain necessary truth, that the nearer the direct rays falling on the eye approach to parallelism, the farther off is their point of interlacement, or the visible point from which they flow. Such are the common opinions concerning our perceiving distances by sight. Thos which make no allowance for the interference of judgment formed by experience, appear to us inadmissible. With all the advantages derived from experience, our judgment of distances is still imperfect, owing to the deceptions arising from the apparent magnitude compared with the real, from the uncertainty attending the intensity of the colours, the appearance of the minute parts of the object, and its relative situation with regard to others. These are the principal means of directing our judgment, and if they be imperfect, or any of them deficient, an error in judgment will be the probable consequence. If we judged by magnitude only, we should be led into numerous errors; it is by considering the other qualities of the object, and its situation with regard to others, that we are led to form a correct judgment as to its real distance. We know that a man equal to us in size, appears smaller a hundred yards off, and smaller still at five hundred. Here, being certain of the real size, we can make use of it with tolerable accuracy in determining the distance. We are deceived, when unacquainted with the real magnitude, we draw conclusions from the apparent only. We know by experience that objects become paler, and more indistinct, in proportion as they are remote. We know by a number of objects being interpolated between ourselves and the object to which we particularly direct our attention, that the latter is at a certain distance. Hence distances at sea appear much shorter than on land. It is only by combining the different sensations, and the judgments arising from them, that we can form an opinion any-
EYE.

fatigued the eye, the latter will cease to be visible. Dr. Darwin divides ocular spectra into four kinds: 1st, such as are owing to a less sensibility of a defined part of the retina, or spectra, from defect of sensibility; 2dly, such as are owing to a greater sensibility of a defined part of the retina, or spectra, from excess of sensibility: 3dly, such as resemble their object in colour as well as in form, or direct ocular spectra; and 4thly, such as are of a colour contrary to that of their object, or reverse ocular spectra. He believes the retina to be in an active state during the excitement of these.

In the first case, the retina is not so easily excited into action by less, irritation, after having been lately subjected to a greater. In the second, the retina is more easily excited into action by greater, irritation, after having been lately subjected to less. In the third, a quantity of stimuli, somewhat greater than natural, excites the retina into spasmatic action, which ceases in a few seconds, or which ceases and recurs alternately. In the last, the retina having been excited into action much greater than natural, falls into opposite spasmatic action, or into various successive spasmatic actions, or into a fixed spasmatic action, which continues for some days, or a temporary paralysis is produced, the effects mentioned being successively proportionate to the increased stimulus.

He adds many miscellaneous remarks on the subject in question, which tend further to illustrate the phenomena by the contrast of the fountains. Dr. Young thinks that the phenomena of the direct spectra may be better understood from the analogy of coloured shadows. There are many instances related of an imperfection in the sight respecting colours, some individuals being only able to tell black from white; others mistaking orange for green; others to whom full greens and full reds appeared alike, white and yellows and dark blues were nicely distinguished. This has been ascribed to an insensibility of the retina to particular colours.

There are many other imperfections of sight which are not introduced here, as not immediately connected with the theory of vision.

The reader is referred for further information to a most excellent catalogue of authors in the second volume of Dr. Young's Natural Philosophy. The list of references is too long to be introduced here, and is too complete to permit us to curtail it. The authors we have been principally indebted to are Zinn, Haller, Hunter, Soemmerring, Cuvier, Home, and Zeller. Haller's rich collection of facts and references to authors in the fifth volume of his Elementa Physiologica, are particularly worth consulting. Portal, in his Tableau Chronologique d'Anatomie, &c. tom. vi. has given a long and very full descriptive catalogue of authors who have written on the subject of the eye, which contains much information.

The comparative structure and anatomy of the eye are very curious; the situation, number, conformation, &c. of this organ in different animals, being finely and wonderfully adapted to their different circumstances, occasions, and manners of living.

In mars, and some other creatures, an ingenious author observes, the eye is placed chiefly to look forward; but withal is so ordered as to take in nearly the hemisphere before it. In birds, (See Birds) and some other creatures, the eyes are so feated as to take in a near whole sphere, that they may the better seek their food and escape danger. In others they are located so as to see behind them, or on each side, whereby to see the enemy pursuing them; thus, in lizards and crocodiles, the eyes are very protuberant, and placed so much towards the side of the head, that their two eyes take in nearly a whole sphere; whereas in dogs that pursue them, the eyes are set more forward in the head, to look that way more than backward.

Generally, the head is contrived to turn this and that way chiefly for the occasions of the eyes; and generally the eyes themselves are movable upwards, downwards, backwards, and sideward, for the more commodious reception of the visual rays. Where nature deviates from these methods, she always makes use of very artful expedients to answer the same end.

Thus, in some creatures, the eyes are set out at a distance from the head, to be moved here and there, the one this way, and the other that; as in snails, particularly, whose eyes are contained in their four protuberances, like atramentous spots fitted to the ends of their horns, or rather to the ends of those black filaments or optic nerves fixed in the horn. Power, Exper. Phil. Obs. 31.

And in other creatures, whose eyes or head are without motion, and in divers insects, that defect is sometimes made up by their having more eyes than two; as in spiders, which having no neck, and consequently the head being immovable, the defect is supplied by the situation and multiplicity of their eyes; some having four, some six, and others eight, all placed in the fore-front of their head, which is round like a locket of diamonds. The reason Dr. Power gives is, that being to live by catching to nimble and fly a prey as flies, they ought to see every way, and to take them per saltum, without any motion of the head to discover them.

Again, men, and most quadrupeds, are found to have several muscles belonging to their eyes, by help whereof they can turn them any way, and so obviate the organ of sense to the object. But nature not having given that mobility to the eyes of flies, she in recompense furnishes them with a multitude of little protuberant parts, finely ranged upon the convex of their large bulging eyes; so that by means of these numerous little fluids vermicular rays of light are deflected from objects placed on either hand, above or beneath the level of the eye, and consequently thrown upon the eye of the object; and then these objects become visible to the animal; and by the help of a good microscope, and a clear sight, some hundreds of these little round protuberances may be discovered, curiously ranged on the convexity of a single eye of an ordinary flesh-fly.

So scorpions are found to have above a hundred eyes; and Swammerdam has observed no less than two thousand in the little insect called ephemerum.

In other creatures the like deficiency is supplied by having their eyes nearly two protuberant hemispheres, each containing a prodigious number of other little segments of a sphere.

The eyes of a camelion, Dr. Goddard observes, resemble a lens, or convex-glass, set in a veritable globular socket, which he turns backward and forward without flaring the head, and ordinarily the one a contrary way to the other.

Lastly, the mole, which the ancients, Aristotle, Pliny, Alb. Magnus, &c. supposed to have no eyes at all, is now found to furnish a notable instance of the diversity of the apparatus of vision; for that animal living altogether under ground, light would generally be useless to it, and so tend to a part as the eye troublesome. It has therefore eyes, but these exceedingly small, and withal situated so far in the head, and covered so strongly over with hair, that they cannot ordinarily be of service or service to it. Yet to guide
guide and secure it a little when it chances to be above-
ground, Borrichius, Blafius, Schneidner, Dr. Derham, and
others, observe that it can pretend, or put them forth be-
yond the skin, and again draw them back at pleasure, some-
what after the manner of flakes.

In the eyes of nocturnal animals is a part not yet men-
tioned, viz. a fort of tapetum at the bottom of the eye
which gives a kind of radiation on the pupil, enabling them
to see and catch their prey in the dark. Thus, Dr. Willis,
"Hujus usus eft oculi pupillam quasi jubare into illumi-
nare—quaré in feclam plurimum illud efi; at homini avibus
& pifciibus de"). De Anima Brutor.

He adds, that in some perfons the iris has a facultv also
of darting out light; and inflances in a man of a hot head
who, after a plentiful drinking of generous wine, could see
to read in the darkft night. Ibid.

The like Pliny tells us of Tib. Cæfar, that upon his first
waking in the night he could fee everything for a little
while as if in broad day-light. (Nat. Hist. lib. xi. cap. 37.)
and Dr. Briggs gives a parallel instance of a gentleman in

Frogs, besides the parts of the eye which they have in
common with men, and most quadrupeds, have a peculiar
membrane or cartilage, which is not commonly perceived,
wherewith they can at pleasure cover the eye without too
much hindering the light; because the membrane is both
transparent and strong, so that it may pass for a kind of
moveable cornea, or occasional safeguard to the eye. A
like membrane is also found in many birds, as also in the
crocodile.

Naturalists relate wonders of the sharpness and accuracy
of the eyes of fome animals, as the eagle, &c. beyond thefe
of man's.

Yet do thefe of men feme improveable to a surprising
degree. Mr. Boyle infances in a major of a regiment of
King Charles I. who being afterwards forced abroad, ven-
tured at Madrid to do his king a piece of service of an ex-
traordinary nature and confequence; which being there
judged very irregular, he was committed to an uncommon
prifon or rather dungeon, having no window belonging to
it, only a hole in the wall, at which the keeper put in
provisions, and presently clofe.it again on the outside, but
not perhaps very exactly. For some weeks this gentleman
continued utterly in the dark, very difconforted; but after-
wards began to think he faw some little glimmering of light;
and this from time to time increafed so, that he could not
only discover the parts of his bed, and other fuch large
objects, but at length, amidst this deep obfcurity, could
perceive the mice that frequented his chamber to eat the
crumbs of bread which fell upon the ground, and difcern
their motions very well.

The author juft mentioned, in his Observations on Vi-
tiated Sight, gives us some uncommon phenomena that regard
the eyes. He furnifhes fewed infances of nycte-
lopies, or people whose eyes in the day-tine were quite
dark, or at leat fo dim that they could hardly difcern their
way; who yet, soon after fun-fet, and during twilight,
faw very clearly.

Eye, Artificial, is the resemblance of a natural eye,
formed either for the purpose of supplying the appearance
of an eye in a perfon who wants one of those natural organs;
or for the purpose of illuftrating the conftitution, together
with certain defects, of the natural eye, defcribed in the
next article.—The latter part of an artificial eye is a little
machine which exhibits the principal parts, and the prin-
cipal offices of a natural eye.

From the defcription of the camera obscura, and from
the anatomical defcription of the eye, it plainly ap-
pears that the latter is a molt excellent camera obscura, having all
the neceffary properties of it, to a molt admirable nice-
ty. It is a globular dark room, with one aperture for the admi-
mination of light, with a lens and other media fit to form a pic-
ture of external objects on the hind part of its cavity, which
is lined with a membrane called the retina. It has likewise
all the neceffary adjustments within certain limits; such as
the power of adapting itself to the view of near as well as
of distant objects, the power of admitting more or less
light, according to circumstances, and fo on. (See Vi-
tiated Sight.) If the eye of an animal, especially
of a large fize, as that of an ox, be taken out foon after
the death of the animal, and the fkin, fat, &c. be care-
fully scraped off from the back of it, until a thin fenfible-
parent pellicle remains, which is the retina; the eye fo pre-
pared may then be used as a little camera obscura: viz. if
it be turned towards any objects, the figures of thofe objects
will be then depicted on the thin membrane juft mentioned,
fo that the observer being placed behind the prepared eye,
may fee that picture very dilliculdy.

In old perffons the humourous grow thicker, and the parts
lefs pliable, hence their eyes lofe in great meafure the power
of adjufting themselves. But, independent of old age, the
eyes of certain perffons can be adjusted for viewing distant
objects earher than for near objects, and vice veffa. When
the eye is defective, and in confequence of its fize or of other
peculiar conformation, parallel rays form their foc before
they arrive at the retina; then the perfon, who is poifefled
of fuch eyes, will be able to fee near objects only; and
fuch perffons are faid to be near-fighted, or myopes. When
the eye is flarter than ordinary, then the foc of rays pro-
ceeding from poor near objects, are formed beyond the
retina; and fuch perffons as are poifefled of eyes thus formed,
are faid to be long-fighted, or phylets; for they can only
adjufi their eyes for viewing objects situated beyond a cer-
tain dilinance; the latter is generally the cafe with perffons
advanced in age.

Thefe imperfections may in great meafure be corrected by
the ufe of proper glaffes or lpectacles; for fince in near-fighted
perffons the rays of light converge to a focus before their ar-
ival at the retina, a converging lena, placed before the eye,
will remedy that imperfection, becaufe a converging lena dimin-
hishes the convergency of the rays of light, and, of course,
will prolong the pencil fo as to enable it to converge exac-
tly on the retina. And for thofe who can fee fimited objects
only with dilinction, that is, in whose eyes the rays of light
do not converge foon enough, convex lenes, which increafes
the convergency of the rays, will remedy the imperfection.

Now the artificial eye we are treating of, ferves to illuf-
trate the above-menioncd defects, together with the cor-
rections by means of lenes. In its moft improved state of
conftitution, it alfo ferves to exhibit imitations of the prin-
cipal parts of the human eye.

The artificial eye is formed principally of glaff, and its
parts are kept together by a braid cell; but the shape and
formation of fuch a machine is, in some meafure, varied by
almost every workman. The part which represents the glo-
be of the eye, and its humouris, is fixed in a focket, where it
can be moved in any direction. The fore-part of the
focket forms a screen to prevent the concurrence of tapi-
uous fight; but it has a hole in its middle, which is
painted round fo as to reprefent nearly a human eye. If this
artificial eye be turned towards objects that are at a mod-
erate distance, their picture will appear very distinct, but
inverted, upon the back part of the machine, where the rough
surface of the glaff performs the office of the retina. The

P.
parts of this artificial eye may be examined in the following manner: unscrew the socket which confines the ball of the eye and its parts; then the outermost coat represents the sclerotic, the more protuberant part of which is the corneal. Next to this there is a plano-convex glass lens to represent the first chamber of the aqueous humour, under which there is a perforated flat piece of tortoise-shell to represent the iris with the pupil, and under this there is another plano-convex lens which represents the second chamber of the aqueous humour. On removing the second coat, which represents the choroides, a small double and equally convex lens will be found which represents the chrysaline humour, and under this is a large piece of glass which occupies the remaining space of the machine, and represents the vitreous humour. The back part of the last mentioned piece of glass is made rough, so that the pictures of objects may be formed upon it, as upon the retina of a real eye.

In order to represent the nature of vision in long-sighted persons, the usual plano-convex lens, which represents the first chamber of the aqueous humour in front of the artificial eye, must be removed, and another similar lens, but less convex, must be placed instead of it. With this alteration, if the artificial eye be turned towards the same objects, which before the alteration were represented distinctly on the back of the machine, they will now form an indistinct image upon the same place, because now the rays converge to a place more distant than the back of the artificial eye. But if in this state a proper convex spectacle lens be placed before it, the image on the back of the artificial eye will be rendered perfect, which shews the use of that kind of spectacle to long-sighted persons. In order to represent the imperfect vision of short-sighted eyes, the plano-convex lens, representing the first chamber of the aqueous humour, must be more convex than the original one. In this case the focus of rays will fall short of the retina, in consequence of which an imperfect image of objects will be formed on the back of the artificial eye; but by placing a proper concave spectacle lens before it, the above-mentioned image may be rendered perfect. And this shews the use of concave lenses to short-sighted persons.

A simpler contrivance of an artificial eye consists of a globular brass box, having a small rough glass on its back, and a convex lens in front. This convex lens is let in a brass socket, which may be screwed farther into, or farther out of the brass box; by which means the picture of objects on the rough glass may be rendered imperfect either by screwing the socket with the lens farther out, which imitates the short-sighted eye, or farther in, which shews the imperfection of long-sighted people; and the image may be rendered perfectly distinct by placing a concave spectacle lens in the front case, or a convex one in the latter case, before the artificial eye.

Eye, Artificial, in Surgery. When suppuration takes place in the eye, the matter at length makes its way through the cornea, and escapes together with the aqueous, and some of the vitreous humour; the transparent cornea is in part destroyed, while the rest continues in a state of opacity; the pupil becomes closed, the iris adherent to the cornea, and the whole eye-ball thrives up in a greater or less degree. A total loss of vision, and great deformity of the conjunctiva, are the evils necessarily arising from this mischief. The skill of these consequences is quite incurable; the second may be obviated by the use of an artificial eye.

Artificial eyes are concave little plates, adapted to the anterior half of the eye. Upon the middle of their front, convex, white surface, the transparent cornea, the pupil, and the iris, are imitated in the best possible manner. When they are applied, what remains of the natural eye-ball lies in their posterior excavated surface. They may be made either of glass or enamel. Though such as are made of glass answer tolerably well, yet they are apt to break. The enamel ones are not subject to this objection, and, as we shall hereafter explain more fully, their back edges may be made with the file better than glass ones, for lying conveniently in the orbit. In the choice of artificial eyes, for every kind of cafe, the surgeon should take care, that the contrivance resembles the natural healthy eye as much as possible, in regard to the colour of the iris, the greater or lesser convexity of the cornea, the greater or lesser projection of the whole eye-ball from the orbit, and the more or less considerable breadth of the globe of the eye between the external and internal canthus.

Artificial eyes are constructed of various shapes and depths. Some are made of a long oval form, and these are found the most eligible for persons, whose eye-lids have a long fissure between them. Other artificial eyes are of a rounder shape, and are proper in cafes, in which the inter-space between the two eye-lids is short. Deep concave plates are to be chosen for patients, whose eyes make a considerable projection forward; but flat ones are to be preferred, when the eyes are naturally small and deeply situated in the sockets. Deep plates are also to be employed, when only a small part of the eye-ball is left; but flat ones, when a considerable portion remains. A principal object always consists in endeavouring to render the resemblance between the artificial and natural eye, as complete as possible, so that the artificial may not be discovered.

When what remains of an eye, which has been destroyed by suppuration or disease, is of middling size, the artificial eye can be applied with the greatest convenience. There is now sufficient room, consequent, no painful pressure is excited, and the instrument does not lie too deeply in the orbit. Besides, the remaining part of the natural eye, which always retains some degree of motion, and lies in the hollow of the artificial one, communicates to the latter a certain motion; so that, in this case, the deception becomes more difficult to detect than in any other examples.

When what remains of the natural eye is too small, or large, it does not enter into the hollow of the artificial one, and, consequently, the latter lies quite immovable under the eye-lids, and the patient has the appearance of squinting in a much greater degree, than in the foregoing case. When the remaining portion of the natural eye has left so little of its original size, that there is not room enough for an artificial one, an opening may be made into the eye-ball, a part of the vitreous humour let out, and thus sufficient room made for the artificial eye. This operation is free from pain and danger; but, it occasionally happens, that the vitreous humour collects again in its original quantity, so as to destroy the space for the artificial eye, and render a repetition of the puncture proper.

When, from any cause, the whole of the eye-ball has been quite destroyed, as, for instance, when it has been extracted on account of some cancerous affection, the use of an artificial eye is hardly admissible. For although the orbit, in this case, usually becomes more or less filled up with flesh, which would serve as a support to an artificial eye, yet the eye-lids generally lose their natural power of motion, and think up to the edges of the orbit, so as not to be capable of covering the artificial eye. Perhaps, however, this kind of contraction of the eye-lids might be prevented, by filling the inside of these parts with lint, immediately
E Y E.

...after extirpating the eye, and keeping them approxi-
imated with strips of adhesive plaster.

The application and removal of an artificial eye are so
causal, that the patient commonly soon acquires the art of put-
ting it on and taking it off himself. The edge of the upper
eye-lid is to be taken hold of with the thumb and index fin-
gers of one hand, and drawn a little outward from the eye-
ball, while the artificial eye, which is to be previously
moistened, must be pushed under the eye-lid with the other
hand. This can be accomplished with moist cafe when the
little corner of the artificial eye is first pushed under the eye-
lid. It then lies tranverse, and pushes the upper eye-lid
so high that the lower edge of the artificial eye is situated
higher than the upper margin of the lower eye-lid. The
lower eye-lid is now to be drawn a little outward with the
finger, while the artificial eye is allowed to glide downward
behind the part.

When the artificial eye is to be taken off, it is only neces-
fary to draw the edge of the lower eye-lid a little outward
with one of the fingers, and to introduce the blunt end of
a needle under the lower margin of the artificial eye, which
is now to be somewhat raised and profiled outward. When
this is done, it immediately slips out of the orbit.

The front surface of what remains of the natural eye is
often uneven, forming a prominence in one place, and a
depression in another; consequently the glass eye fits closer
on some parts than on others, and creates such painful fen-
sations as oblige the patient to remove it. This inconvenience
may be obviated by taking off the border of the artificial eye at the parts which fit too
closely, and make too much profile, by means of a file.

When the whole circumference of the eye remains after the
application of the glass one, the plate employed is probably
too deep, and the whole circumference of its edge makes
too strong profile. In this circumstance a flat plate must
be applied. When, notwithstanding this plan, the eye
continues painful, there is reason for apprehending that the
organ is in an irritable state. In this instance, the best
way is to take off the instrument again, and bathe the eye
well with cold water, or some astringent collyrium. After
a time, the eye-ball generally becomes capable of bearing
the profile of the artificial eye, without any uneas-
iness. However, some patients are so irritable, that they
can never wear an artificial eye without suffering pain,
and such persons ought to be advised to give up the intention
altogether.

It is obvious, that in every example in which the eye
has been destroyed by lappuration, no idea should ever be
entertained of using an artificial eye, before all inflamma-
tion and tenderness of the organ have been quite removed. Also,
the use of the artificial eye must always be discontinued,
whenever an inflammation is brought on by any accidental
causes.

Persons should be recommended always to keep by them
more than one artificial eye of the same kind, in case one
should ever happen to be lost. It is also advisable to take
off the artificial eye once every day, and cleanse it, and par-
ticularly the orbit, from all kinds of dirt, mucus, &c.

Want of attention of this kind is frequently the cause of much
inflammations, as compel the patient to discontinue the use of
an artificial eye for a considerable time. See Richter's An-
fangsnrnade der Wundartzneykund'; Band 3.

Eye, Cancer, and Extermination of. It becomes indispens-
ably necessary to remove the eye-ball in several kinds of
cases; as, for instance, when the organ protrudes from the
orbit, and cannot be reduced. The operation is also requi-
site for some ulcerated iraphylomas, and for every kind of
cafe in which the coats and humours of the eye are so dif-
cafed, as not to admit of being referred to a natural state,
and in which the affection, if left to itself, would be likely
to be communicated to the orbit.

Cancer of the eye, however, is the chief disorder, which
creates a necessity for the performance of the opera-
tion.

The eye may become affected with cancer in three differ-
ent manners. Sometimes the globe of the eye acquires an
irregular knotty shape, and enlarges to the size of an apple.
The sight is gradually destroyed, the blood-vessels in the
part of the eye are varicose, and the whole of the internal
and external structure of the organ is so altered, that the
part looks like a piece of flesh, and no vestiges of the origi-
nal organization are any longer perceptible. Sometimes,
a small remaining portion of the transparent cornea is exter-
ally observable; and, in certain cases, a little aperture may
still be seen within, through which the remainder of the vi-
treous humour and choroid coat is discoverable. Sometimes
a vast fluid is discharged from the diseased organ, an
ulcerated opening into the part having occurred. Occasion-
ally, no ulceration whatever can be noticed, and the eye-
ball remains a firm piece of flesh. The patient commonly
experiences at first burning pains in the eye, which, how-
ever, are not in an insupportable degree; but, at last, they
become of a violent darting nature, and shoot all over one-half
of the head. The cause of this dilatation are involved in
considerable obscurity. A German surgeon, named Vogel,
mentions, that the disease is sometimes brought on by the
small-pox. The foregoing form of cancer of the eye is the
principal, and most frequent one. Sometimes the excrences make their appearance upon the
front surface of the eye, and most frequently upon the trans-
parent cornea. Such tumours often admit of being eradi-
cated with the knife, ligature, or cautery. In certain in-
fances, however, they always grow again after the employ-
ment of these means, and become larger, more malignant,
and even cancerous. At length, they change into a tun-
gous growth, which is extremely painful, covers all the an-
terior part of the eye, and renders the operation of removing
this organ absolutely necessary. Such is the second form
in which cancer of the eye prefers itself.

On several occasions ulcers are produced upon the for-
cest part of the eye, and although a great many of them may
be cured by the use of external and internal remedies, they
are often exceedingly obdurate, delay any benefit, and acquire
so malignant a state, that they may very well be called
cancerous. This is the third species of cancer, which
makes the extirpation of the eye requisite.

With regard to the treatment of every cancerous kind of
disease, affecting the eye, we have a choice of three differ-
ent methods. We either plainly divide into particular
determinate cases, and employ medicines calculated for its
removal; or the malignant character of the symptoms leads
us to have recourse to the remedies usually preferred for
carcinomatous diseases; or else, when both these plans fail,
we proceed to put in practice the extirpation of the eye.
What is commonly called a cancer of the eye does not seem
to be nearly so malignant as the same sort of disease in the
breast; for the operation almost always accomplishes a rad-
ical cure, as long as the dilatation is confined to the globe
of the eye, and the eye-lids, cellular substance, and bones of
the orbit continue unaffected. The knowledge of this cir-
cumstance should lead us to undertake the operation in good
time, and we can the more readily make up our mind to
perform it, since the power of seeing is, in all these cases,
irrecoverably lost. When the patient suffers violent
head-
In the performance of the operation there are two important circumstances, to which attention ought to be paid. The first is to remove every particle of the diseased, and leave none of the affected parts behind. The second is to avoid doing any injury to the peritoneum and bones of the orbit. The peritoneum, in this situation, lies so near the dura mater, that the consequences of any mischief done to the first membrane, may easily extend to the lat; and the bones of the orbit are in most places so thin, that they cannot be pierced, or broken, without a risk of injuring the brain, which is situated immediately behind them.

It is on this account that some surgical writers have recommended, for the performance of this operation, instruments which have no points. A man, ended with a very moderate share of dexterity, however, may certainly use a pointed knife for the purpose both with safety and advantage.

In order to be able to separate the eye-lids far enough from each other, it is sometimes recommended, in the first instance, to make an incision through them at their external commissures. An assistant is to raise the upper eye-lid as much as possible towards the forehead. Some authors also advise us to introduce through the eye-ball a ligature, with which the part may be drawn to one side, or the other, during the operation. We cannot conceive, however, that there can be any real occasion for this painful proceeding, nor for the employment of any kind of hook, with a similar intention, since any operator possessing common adroitness may easily succeed in drawing the globe of the eye forward with his fingers, as soon as it is detached, from its connections within the orbit.

In this operation, surgeons have sometimes made use of a fcelped curved sideways, and a pair of scissors of a similar shape, with which instruments it has been supposed that the parts behind the globe of the eye can be more conveniently cut, than with any straight ones. But many of the ball operators prefer a straight instrument, and find no inconveniences attending its use. The surgeon should first divide the conjunctiva connecting the eye-lids with the eye-ball, and this ought to be done both above and below. Then the nerves and muscles of the eye are to be cut on all sides of the organ; a part of the operation sometimes effected with crooked scissors, though, as we have already observed, it may be as well done with a common straight knife. When a ligature is introduced through the front of the eye ball, or when a hook is used, the surgeon, by such means, is always to draw the globe of the eye in that direction which will give most room on the side where the parts are to be cut. But we consider the employment of a ligature, or hook, for the purpose of pulling the globe of the eye in this manner, quite uneccesary, and therefore improper.

Richter takes notice, that as the enlarged eye for the most part lies close to the cheek, and it is frequently very difficult to make an incision into the orbit, between the eye-ball and lower eye-lid, the operation may often be more easily accomplished by first separating the upper eye-lid from the diseased organ; then cutting from above downwards more deeply into the orbit, so as to divide the muscles above and at the sides of the eye, and, lastly, detaching the eye-ball from its connection with the lower eye-lid. This mode of operating is, according to Richter, the more easy, because the globe of the eye can always be more readily inclined downwards, so as to make room above, than it can be pulled in the direction upward for the purpose of making room below. Until the optic nerve has been divided, the operator must avoid drawing the eye-ball too forcibly forward.

As soon as the eye has been completely detached, all the inside of the orbit should be very carefully examined with the fingers, and whatever indurated parts are discovered ought to be diligently removed.

In certain instances, it is proper and prudent to cut away one, or both eye-lids, when affected with cancerous difease. Surgical writers also seem universally to agree about the propriety of always removing the lacrimal gland, as it is particularly apt to be the source of such fungous excreitions as are to be apprehended after the operation.

Let the parts, however, be taken away with the utmost skill and caution, till the event of the operation is invariably to be regarded as extremely doubtful, when the adjacent parts participate in the diseased with the eye-ball.

The bleeding is seldom of any importance, generally stopping as soon as the orbit is filled with soft lint. The inflammatory symptoms and fever are also familiar to violent as to require any antiphlogistic means, except a low diet, and keeping the bowels well open.

During the suppuration, the orbit becomes filled with healthy granulations, and the processes of cicatrization must be regulated by the same principles, which are observed in the treatment of common wounds.

When the cure is complete, an artificial eye can seldom be worn, on account of the manner in which both the eye-lids shrivelled, and contracted, to the upper and lower margin of the orbit. It is true, an attempt may be made to prevent such contraction of the eye-lids, by using a bandage and strips of sticking plaster to keep the parts together, after the orbit is filled with lint. However, notwithstanding our best endeavours, it must be confessed, that an artificial eye can seldom be made use of after the operation.

Sometimes the granulations, which form in the orbit, are bobby and indolent, in which circumstance some mild antifeptic should be applied, as for instance, lapis calamina, prussia myrrha, aubum sulfurium, &c. In some examples, the granulations acquire a fungous and malignant nature, in which event they should either be cut away with a scalpel, or destroyed with cautery. Sometimes the fungus is continually reproduced, and at length occasions death. In some cases, as late as half a year, or even later, after the cure has appeared perfect, a fungous excrecence has arisen, and proved fatal. Occasionally head-aches, vomiting, convulsions, &c. followed by death, come on a few days, or weeks, after the operation. It is said, that in cases of this kind the cancerous dillerences has been discovered to have spread to the brain, along the optic nerve, and to have excited induration and ulceration in that viscus.

When a fungous malignant excrecence occurs on the cornea, there is no occasion to extirpate the whole eye. It is quite sufficient to cut off the anterior portion of the organ; for the base of the fungus seldom extends beyond the edge of the cornea. The operation may be effected by making a puncture into the eye with a lance, a little way behind the margin of the cornea, and then enlarging the wound all round by means of a pair of scissors.

Though the base of the excrecence does not often extend into the white of the eye, yet, it is observable, that the coats of this organ, for a greater or less extent around the root...
Eye, Contusions of the. See Ophthalmia.

Eye, Diversee of the, are an ophthalmia, or inflammation of the eye; the gutta serena, or amarosis, a fulness, or cataract; in eczema; a glaucoma; an amyoplia, or obliquity of sight, including the myopia, the prebyopia, the nystagmia, and the amarosis; the strabismus, or squinting; an uguus pannus, or pterygium of the membrane of the eye; the albigo, leucoma, or spot in the eye; a fogulation of the eye; an epiphora, or rheum in the eyes; a trichiasis; and the fistula lachrymalis. See each described under its peculiar denomination. See Warner's Description of the human Eye, &c. with its principal Diseases, &c. 2d edit. 1775.

Eye, Fulling out of the. See Prolapsus oculi.

Eye, Running of the, in Infants. See Infant.

Eye, Scarification of the. See Scarification.

Eye, Wounds of the. See Wounds.

Eye of Birds. See Anatomy of Birds.

Eye of Fishes. See Fish.

Eye of Flies. Every naturalist has observed, that the eyes of flies are of a reticulated texture; and each reticulated eye of this kind is truly an assemblage of multitudes, often of many thousands, of small but perfect eyes. The reticulated eyes of flies are large, not only in proportion to the size of the creature, but absolutely, and in themselves; but the several small eyes of which they are compos'd are remarkably minute in comparison of those of the butterfly clas.

Many of the butterfly clas have in each of their reticulated eyes many thouand small eyes; but the fly clas greatly exceed them in number of these, as many of the eyes of these are three times as large as those of the butterflies; and besides, that each smaller eye is vastly more minute than the small eyes of the butterflies.

Mr. Hook computed 14,000 hemispheres in the two eyes of a drone; Mr. Lewenhoek reckoned 6236 in a silk-worm's two eyes in its fly-flate; 3181 in each eye of a beetle; and 8000 in the two eyes of a common fly. The pearl-eyes of the dragon-fly appear with a common reading-glass like fogreen; and Mr. Lewenhoek reckons in each eye of this insect 12,544 lenses, placed in an hexagonal position, each lens having six others round it. He also observed in the centre of each lens a minute transparent spot, brighter than the rest, suppos'd to be the pupil, surroun'd with three circles, and in appearance seven times less than the diameter of the whole lens. Mr. Puget counted 17,325 in the eye of a butterfly, which Malpighi concludes to be distinct and separate eyes. The abbe Catalan, and others, have since shown, that all the eminences discoverable in the cornea of insects have the necessary parts, and perform the offices of an eye. Lewenhoek discovered the bundles of optic nerves which serve these small lenses; and Remann supposes that these supply the place of all that is wanting behind the lenses, for the organization of an eye complete for vision. Baker's Micr. 1743 p. 228. Remann, Hist. Inf. vol. i. p. 261, &c. See Entomology.

Eyes of Horfes, in the Mange, &c. These should be bright, lively, full of fire, pretty large, and full; but not too big, gogling, or glaring out of the head: they should also be resolute, bold, and brisk. A horse to appear well, should look on his object fixedly, with a kind of disdain, and not turn his eyes another way.

In the eye of a horse are discovered its inclination, health, and indispisition. When the eyes are sunk, or the eyebrows are too much raised up, and as it were fuelled, it is a sign of viciousness and ill nature. When the pits above the eyes are a tremely hollow, it is for the most part a certain sign of old age: this, however, does not hold of horses got by an old stallion; for these have them very deep at the age of four or five years, as also their eye-lids and eyebrows wrinkled and hollow.

Two things are chiefly to be considered in the eye of a horse, viz. the chrysaline part, and the bottom or ground. The chrysaline, or most transparent part, should for clearness, resemble a piece of rock-crystal, otherwise the eye cannot be good. When this part is reddish it is a sign that the eye is inflamed, or else, as some pretend, influenced by the moon. When it is of the colour of a withered or dead leaf upon the lower part, and troubled on the upper, it infallibly shows that the horse is lunatic, which diet—ager continues no longer than while the humour actually poyses the eye.

As to the ground or bottom of the eye, which is properly its pupil or apple, it should be large and full, and ought to be carefully inspected, that there be no foreign, as it is called, on it. This is a white spot or freckle, which at first appears no bigger than a grain of millet, but grows to such a bigness as to cover the whole apple of the eye; it is incurable, never failing to make a horse blind in the eye where it is found. If the whole bottom of the eye be white, or of a transparent greenish white, it is a bad indication, though perhaps the horse is not as yet quite blind: however, it ought to be observed, that if you view a horse's eyes when opposite to a white wall, the reflection of it will make their apples appear whitish, sometimes inclining to green, though they be really good. When this is perceived, you may try whether his eyes have the same appearance in another place.

In case you perceive above the bottom of the eye, as if it were, two grains of chimney-foot fixed thereto, it is a sign the chrysaline is transparent; and if, besides this, the said bottom be without a spot or whitish, then you may infer that the eye is found.

You ought also to examine whether an eye which is troubled and very brown be less than the other; for if it be, it is irrecoverably lost.

All eyes which are small, narrow, and have long pupils, run a greater risk of losing the sight than any others. See Blindness.

The diseases of the eyes in horses proceed either from a defluxion, or from some external hurt. In the former case the eyes are watery, hot, red, and swollen, the ditterer advancing by degrees; in the latter the maldy comes speedily to a height, and the skin on the outside of the eye is peeled off.

If the deflitter make its rise from a rheum or defluxion, it is to be considered whether it proceeds from the eye itself, or from another aggrieved part: in the latter case, the rebound of the part will set the eye free; in the former, it is proper to cool the horse's blood with an ounce of fal purgative, mingled every day with his bran; and when it leaves his appetite, to change it for liver of antimony till he recovers his stomach.

For sore eyes, where a skin is growing over them, the following receipt is recommended: to the white of an egg add a little fine powdered salt; then let this on the eye till
till it be reduced to a powder. This, mixed with a little honey, is to be put into the horse's eye with a feather. If it is found insufficient to eat off the skin, the powder alone must be blown into the eye with a quill.

In case of a blow on the eye, take honey, and having added a small quantity of powder of ginger, put it into the horse's eye; or else take large drops of oil, with the oil of roses and elder, of each an equal quantity; then, having melted them together, pour into the eye therewith.

Some horses have naturally tender weeping eyes, which void a sharp cutting humour; there are easily cured, by washing or bathing them every morning or evening with brandy. See Hore.

We say also, "a horse unobd of one eye," which is a railing expression, importing that he is blind of an eye.

Eye of the Branch of a Briare, is the uppermost part of the branch which is flat, with a hole in it, for joining the branch to the head-aill, and for keeping the curb fall.

Eye of a Bear, is a black speck or mark in the cavity of the corner teeth, which is formed there about the age of five and a half, and continues till seven or eight; and it is from hence that we usually say, such a horse marks still, and such a one has no mark.

Eye-Flaps, those pieces of leather which cover the eyes of coach horses.

Eye, Altitude of the. See Altitude.

Eye, in Architecture, is used for any round window made in a pediment, an attic, the reins of a vault, or the like.

Eye, Bullock's, Oil de kauf, denotes a little sky-light in the covering or roof, intended to illuminate a granary, or the like.

The same term is applied to the little lutherns in a dome; as in that of St. Peter's at Rome, which has forty-eight in three rows. See LUTHER.

Eye of a Dome, denotes an aperture at the top of the dome; as that of the Pantheon at Rome, or of St. Paul's at London. It is usually covered with a lantern. See DOME.

Eye of the Volute, is the centre of the volute, or that point wherein the helix or spiral whereof it is formed commences; or it is the little circle in the middle of the volute, wherein are found the thirteen centres for describing the circumvolutions thereof.

Eye, in Gardening, a term which in the management of fruit-trees signifies the small bud or shoot which is to be inferted into another tree. See Bud and BUDGING.

It also signifies the small pointed knot to which the leaves adhere, and from which the shoots spring forth. The eye of a pear denotes the extremity opposite to its stalk.

Eye, in Geography, a town of Norway; 56 miles S. of Bergen.

Eye, a market and borough town of Saffolks, England; is situated in the hundred of Harthusire, at the distance of 20 miles from Ipswich, and 90 from London. It is seated in a valley, and is almost surrounded by a brook, which gives name to the place. As a borough it was first incorporated by king John, from whole charter, and some that have been subsequently granted, it derived several privileges, but many of these have latterly been discontinued. The borough did not return members to parliament till the thirteenth year of the reign of queen Elizabeth, since which period it has sent two. The right of election is vested in the free burgesses, corporation, and those inhabitants who pay "scot and lot," a number amounting to about 200. The earl of Cornwallis is patron, or prior of the borough, and thereby has the power of controlling the elections. In the reign of king William I. a priory for Benedictine monks was founded here, and in the time of king Edward III. an hospital for lepers. The traces are mostly narrow. The church is a large, handsome building. In the year 1801 the town contained of 300 houses, and contained 1734 inhabitants. There is a weekly market on Saturdays, and an annual fair. It has a small manufacture of bone-lice; and some of the inhabitants are occupied in spinning. Kirby's Saffolks Traveller.

Eye, a river of Scotland, which rises in the north-west part of Berwickshire, and falls into the North sea, at Eyemouth.

Eye is also used among Jewellers for the lustre and brilliance of pearls and precious stones, more usually called the power.

Eye, among Naturalists, is sometimes also used for a hole or aperture: whence it is that the flir of the larger intestines is called cecum, or the blind gut, as having no eye or perforation. For a like reason the chemists call a close vessel, used in distillation, a blind head.

Eye, in Perspective. See Perspective.

Eye, in Printing, is sometimes used for the thicknefs of the types and characters used in printing; or, more strictly, it is the graving in relief on the top of the letter; otherwife called its face.

It is the eye or face that makes the impression; the rest, which they call the body, serving only to fustain it.

The eye of the is the little aperture at the head of that character, which distinguishes it from the c. See E.

Eye, in a Ship. The hole wherein the ring of the anchor is put into the shank is called the "eye of the anchor," and the compas or ring which is left of the shrop to which any block is fixed, is called the "eye of the shrop."

Eye of a Stay, is that part of a flag which is formed into a sort of collar to go round the mast-head.

Eye-Bolt, is a long bar of iron with an eye in one end of it, formed to be driven into the decks or sides of a ship for divers purpoſes, as to hook tackles, or fatten ropes to, as occasion requires.

Eye-Bolt-Hole. See SAIL.

Eyes of a Ship, a name frequently given to those parts which he near the haule holes particularly in the lower apartments within the vessel.

Eye-Bright, in Botany. See Ephedra.

Eye-Brow. See Eye, in Anatomy.

Eye-Brows, wounded. See WOUNDS.

Eye-Brown, in Architecture. See FILLET.

Eye-Glafs, in our Double Microfcope, is usually a lens convex on both sides; but Euclidius Divini long since invented a microscope of this kind, the power of which he places very greatly above that of the common fort; and this principally depending on the eye-glafs, which was double, consisting of two plano-convex glases, so placed as to touch one another in the middle of their convex surface. This instrument is spoken of with great credit by Fabri in his Optics, and is said to have this peculiar excellence, that it shows all the objects flat, and not crooked, and takes in a large area, though it magnifies extremely much. Phil. Trans. No. 40.

Eye-Glafs, in Telefcope, is the lens next the eye; and if the telecope consist of more than two leafe, all but that next the object are called eye-glases.

Eyes-hid, Encysted tumours of, in Surgery. Encysted tumours
mourns frequently form on the eye-lids: indeed, this is so much the case, that some surgical writers assert that such swellings are more often found situated on those parts than any where else in the body.

We shall not stop to refute the opinion which has occasionally started up, that the frequency of encysted tumours on the eye-lids arises from the great number of cicatricial glands existing in those parts, which glands have been supposed to swell and enlarge from some cause or another. Scarpa points out, that the glands of Mabomius are only situated at the edges of the eye-lids, and that encysted tumours are not more common on this part of the eye-lids than on others.

Scarpa remarks, that an encysted tumour of the eye-lids, in its early state, does not exceed a millet-seed or a small pea in size, and that it is long before a swelling of this kind becomes as large as a bean or filbert. The tumour is in general unattended with pain; but some uneasiness is experienced as soon as the diffuse has acquired such magnitude that the free motion of the eye-lid, a partial depression of it, and a degree of pressure on the eye-ball, are produced.

Scarpa expresses a conviction, founded on the observation of numerous cases, that these tumours are, from their first origin, most commonly nearer to the internal membrane of the eye-lids than to the integuments, their bases being so superficially situated on the inner surface of the eye-lids, that, when such surface is turned outwards, the swellings seem quite denuded, and look transparent through the delicate lining of the palpebra.

Various applications have been tried, with a view of differing encysted tumours of the eye-lids; as, for instance, collyria, containing the aqua ammonia in a very diluted state, resolvent gums, mucilaginous frictions, &c. Scarpa observes, however, that he has found little success attend the use of these remedies, that he is convinced, the only effectual mode of cure, particularly when the tumour is of long standing, consists in having recourse to extirpation.

A surgeon, who adopts Scarpa’s opinion, naturally decides, that the best way of removing encysted tumours of the eye-lids is, generally speaking, to extract them through an incision made on the inside of the eye-lid. The reasons urged by Scarpa, in favour of this practice, are, that the wound need only be a very superficial one, the eye may be easily separated from the surrounding parts, the place readily heals, and no scar is left to denote either that there has been any dis ease or operation.

Scarpa allows, however, that there is one case in which this plan of operating should not be chosen. When the encysted tumour is so situated upon either eye-lid that the part cannot be sufficiently turned inside out, to bring into view the base of the swelling, and to enable the surgeon to cut away the whole of it, the cut should be made from without.

When the encysted tumour is on the upper eye-lid, the patient being seated with his head firmly supported, an assistant is to turn out the upper eye-lid, and press in such a manner as will make the tumour project as much as possible.

The surgeon is next to divide, with a lancet, or convex-edged scalpel, the delicate membrane spread over the tumour. He is to observe to make the incision in the direction of the edge of the eye-lid, and of sufficient size to allow the tumour to project and be taken out with ease. The swelling may now be taken hold of with a pair of forceps, or a tenacula, and detached from all its connections with the knife, or, as some may prefer, with a pair of scissors. The eye-lid is then to be put into its natural position again, and kept wet with linen dipped in the fattening lotion.

The operation on the lower eye-lid is not materially different from the one already described.

When an encysted tumour is to be removed from the eye-lid of a child, Scarpa advises the child to be laid on a table, with the head raised on a pillow, and the hands and feet firmly held by attendants.

In quadrupeds the lower palpebra is moveable, and is the smaller; in birds, on the contrary, the lower is moveable, and the greater.

Animals that have hard eyes, as lobsters, and the generality of fishes, have no palpebra, such eyes being sufficiently secured without on others.

In the generality of brutes there is a kind of a third eye-lid, which is drawn like a curtain, to wipe off the humidity which might incommodate the eyes; it is called the mitratiing membrane.

The monkey is almost the only one that wants it, as being furnished, like a man, with hands to wipe the eye on occasion.

Eye-lids, Encysted. See Wounds.

Eye, Balls, in Astronomy, a star of the first magnitude, in the constellation Taurus, by the Arabs called Aldebaran.

Eye, Cat’s, Oculus cati, in Natural History, a precious stone, called also Jun’s eye, occlus fulis, and taken by Dr. Woodward for the almerias of the ancients. See Cat’s eye.

Eye, Crab’s, Oculus carumorae. See Crab’s eye.

Eye, Goat’s, Oculus caprinius, is when there is a white speck on the pupil of the eye, as seen in the eyes of goats.

Physicians call it eyaxis.

Eye, Golden, in Ornithology. See Duck.

Eye, Hare’s, Oculus leporinus, in Surgery, a diffuse arising from a contraction of the upper eye-lid, which prevents its being able to cover its part of the eye, so that the patient is obliged to sleep with the eye half open, after the manner of hares.

Physicians call it lagophthalmia, a Greek word signifying the same thing, being compounded of lagra, bare, and ichthious, eye.

Eyeable, in Rural Economy, is a provincial term used to denote the fine appearance of collections of sheep and neat cattle.

EYEMOUTH, in Geography, a small fishing town in the shire of Berwick, having a good harbour for small craft at the mouth of the river Eye. In the reign of Elizabeth the French took possession of it for the queen mother, and fortified it, as being a convenient port for landing supplies. But queen Elizabeth supporting the cause of the reformers, the French were soon obliged to quit the country. A considerable herring fishery occupies the inhabitants. In 1791 six busses only were employed, but there is abundance of room for numbers more, as the coast abounds with various kinds of fish. In 1756 the harbour was improved by the erection of a new pier on the western side, and in 1759 another on the eastern side was added; since which the trade has increased, and much corn and meal are annually exported. It has two annual fairs in June and October, and is situated nine miles north by west of Berwick, and 339 miles from London. Sir John Sinclair’s Stat. Acc. of Scotland.

EVERDORF, a town of Germany, in the principality of Wurzburg; five miles S.S.W., of Kullangen.

EVERHEIM, a town of Germany, in the principality of Wurzburg; seven miles E.S.E., of Schwafrunit.

EVERKANT, an island at the entrance into the Zuyder sea from the German ocean, N. of the Texel, about 2½ miles in length, and half a mile wide; joined to the island
EYN

island of Texel by a bank of sand, and overflowed only at high water.

EYESS, in Falconry. See Eyrie and Falcon.

EYETON, or Ayton, in Geography, a town of Scotland, in Berwickshire, located on the river Eye; seven miles N. of Berwick-upon-Tweed.

EYERDING, See Efferding.

EYGUEL, a river of France, which runs into the Sarre; five miles N.E. of Sarre Alb.

EYGUIÈRES, a town of France, in the department of the Bouches, or Mouths of the Rhone, and chief place of a canton, in the district of Tarascon; 16 miles E.S.E. of Tarascon; the place contains 2925, and the canton 73,225 inhabitants, in seven communes and a territorial extent of 245 kilometres.

EYGURANDE, a town of France, in the department of Corrèze, and chief place of a canton, in the district of Ussel; the place contains 994, and the canton 4667 inhabitants, on a territory of 180 square miles, in 12 communes.

EYKHOUTS DOUBLET, in Conchology, the name of Venus maculosa, in Leer's Catal.

EYLA, in Geography, a river of Saxony, which runs into the Wicza, two miles N. of Borna, in the marginale of Meißen.—Also, a town of Sicily, in the valley of Mazara; 25 miles E.S.E. of Palermo.

EYLAND, a river of Brandenburg, which runs into the Oder; two miles S. of Frankfort.

EYLANDEN, one of the smaller Japanese islands. N. lat. 42° 45'. E. long. 130° 10'.

EYLAU, DRUTSCHE, a town of Prussia, in the province of Oberland; 42 miles E.N.E. of Culm. N. lat. 53° 30'. E. long. 19° 24'.

EYLAU, Pfreifisch, a town of Prussia, in the province of Natangen; 20 miles S. of Königsberg; famous for a bloody battle fought near it in February 1807, between the French and the Russians. N. lat. 54° 20'. E. long. 20° 42'.

EYLES'S ISLAND, a small island in the Mergui Archipelago, near the south coast of Sullivan's island. N. lat. 10° 46'.

EYLL, a river of France, which runs into the Roer, near Juliers.

EYME, a town of Germany, in the principality of Calenberg; 16 miles E. of Hameln.

EYMÉT, a town of France, in the department of the Dordogne, and chief place of a canton, in the district of Bergerac; 12 miles S. of Bergerac. The place contains 1532, and the canton 51,024 inhabitants, in 14 communes, on a territory of 1224 square kilometres.

EYMOUTIERS, a town of France, in the department of Upper Vienne, and chief place of a canton, in the district of Limoges; 18 miles N. of Limoges. The place contains 1521, and the canton 13,519 inhabitants, in 16 communes, on a territory of 370 square kilometres. This town carries on a considerable trade in skins, leather, and rags. —Also, a town of France, in the department of the Dordogne; 15 miles N. of Perigueux.

EYNHOFVEN, a town of Brabant, situated on the Damme; 25 miles W. of Yvolette.

EYNON, a river of Wales, which runs into the Dovic, about three miles below Machynlleth.

EYNSHAM, a village of England, in the county of Oxford, six miles N.W. of Oxford, famous for a monastery founded here by Athelmer, or Aylmer, earl of Cornwall and Devon, before the year 1005; and also for a council held here by king Ethelred, at which the archbishops and bishops of the realm attended, and many acts, ecclesiastical and civil, were passed. The number of inhabitants in 1801 was 1166.

EYPEL, a town of Bohemia, in the circle of Konigigratz; three miles S.S.E. of Trautman.

EYPTOLAN, a town of Austria, on the north side of the Danube; five miles N. of Vienna.

EYRAGUES, a town of France, in the department of the Mouths of the Rhone; eight miles E.N.E. of Tarascon. EYRE, a town of North Carolina; 48 miles W. of Halifax.

Eyré, or Iré, a mountain of Africa, between Fezzan and Caïntha.

Eyre, or Eire, in Law, signifies the court of justices itinerant.

The word seems formed of the old French, ire, iter, away, track.

Hence justices in eyre are those whom Bracton calls jufiliarii itinerantes. See Justices in Eyre.

Eyre of the Forth, is otherwise called jufliter-fleet, which by the ancient custom was to be held every three years by the justices of the foref, journeying up and down for that purpose. See Justices.

EYRECOURT, in Geography, a poit town of the county of Galway, Ireland; 72 Irish miles west from Dublin, and about 34 east from Galway.

EYRIE, or AYRKY, among Falconers, the next where hawks sit and hatch, and feed their young.

Hence a young hawk, newly taken from the nest, is called an eyriel.

EYRON, in Geography. See Eiron.

EYSACH, a river of the Tyrolez, which runs into the Adige, near Bolzano.

EYSDALE, or ESDELE, a small island near the west coast of Scotland, celebrated for its quarries of excellent flint; seven miles S.E. from Mull. N. lat. 56° 18'. W. long. 5° 41'.

EYSENDENBERG, a town of Prussia, in Natangen; 20 miles S.S.W. of Brandenburg.

EYSL, a town of Germany, in the principality of Anspach; four miles N. of Thalmeining.


El. Ch. Calyx of five leaves, inferior. Petals five, ovate. Berry of one cell, with four seeds. E. jucunda. Lour. 235. Native of the lofty mountains of Cochinchina. A large tree, whose wood is red, even, firm, of an ample size, fit for the purposes of building. Branches spreading. Leaves alternate, ovate-oblong, pointed, entire, smooth, velvety. Flowers white, in nearly simple oblong clusters, about the ends of the branches. Berry smooth, with a hard skin, pulpy internally, of a middling size, not eatable.

Such is Loureir's account. We know no described tree to which his description is applicable. The number of seeds which he attributes to this genus, four instead of three, renders its natural order doubtful.

EYSTENEY, called also Eyfon-Nis, in Geography, is a remarkable
remarkable head-land in Suffolk, formerly accounted the most eastern point of the island, whence it received its Saxan, or rather Britith, denomination. But since the latitudes and longitudes of places have been more accurately ascertained by modern discoveries, the statement has been found erroneous; part of the Norfolk coast having a more easterly bearing. This point was the EOWNH, or Esturio Praenomanorum of the Roman geographer Ptolemy. "And to put it out of doubt," says Camden in his Britannia, "that it is the same we call Ealton, it is to be observed, that Eternity signifies the fame in Britith, as Epoxi in Greek, or Estutor in Latin. Though the name in our language may be with as much probability derived from its easterly situation." (Vol. ii. Gough's Edit. p. 76.) The probability, however, is in favour of the Britith derivation. Eilen or Eyllen, in Celtic, means to extend, and by, prominent; hence Eyllenby, or Ephelyne, will signify the extended protection, or bold promontory. Horsley places it at Gunfleet, in the county of Essex. EYTPOH HOTUN, a town of Corea; 380 miles E of Peking. EYVANOUITZ, a town of Moravia, in the circle of Olmutz; 16 miles S. W. of Olmutz. EZA, a town of France, in the department of the Maritime Alps; 4 miles E. of Nice. EZAGEN, a town of Africa, in Fez; 60 miles S. of Tetuan. EZAWEN, a town of Africa, in the country of Sahara; 70 miles N. W. of Tombuctoo. EZDOUD, a town of Syria, on the site of the ancient Azotus, or Ahdod, famous at present for its scorpions. This town, which was once so powerful under the Phyllines, affords no proofs of its ancient importance. Three leagues from Ezoud is the village of El-Majdal, where they flatten the finest cottons in Paladine, which, however, are very coarse.

EZEKIEL, in Scripture Biography, one of the inspired prophets, whose predictions are recorded in the Old Testament. He was the son of Buzi of the house of Aaron, and one of the captives carried by Nebuchadnezzar to Babylon with Jeconiah or Jehoiachin. The era at which he commences his prophecies was the fifth year of Jehoiachin's captivity, or the fifth of Zedekiah, or the 553d year B. C. Jeremiah was his contemporary, and prophesied at the same time in Judæa. Ezekiel, after his captivity, inhabited some place on the river Chebar, which flows into the Euphrates about 200 miles northward of Babylon; and this was the scene of his predictions, though he was occasionally conveyed in vision to Jerusæum; and his prophecies were continued for about 22 years. The events of his life, after his advancement to the prophetical office, are interwoven with the detail which he himself has given of his predictions; and the manner of its termination is no where ascertained. Epirnians, indeed, if he be the author of the life of this prophet that is ascribed to him, informs us, that he was put to death by the prince or commander of the Jews in the place of his exile, because he was addicted to idolatry, and could not bear the reproaches of the prophet. But on this account, which is intermixed with many fables, we can, place no reliance. The subjects of Ezekiel's prophecies, contained in the canonical book of the Old Testament, bearing his name, are the dreadful calamities, soon after inflicted upon Judæa and Jerusæum, on account of the idolatry, impiety, and profaneness of their inhabitants; the divine judgments that would be executed on the false prophets and prophecy, who deluded and hardened the Jews in their rebellion against God; the punishments which should befal the Ammonites, Edomites, and Philistines, for their hatred of the Jews, and for insulting over them in their distress; the destruction of Tyre, which he places in the 26th year of the captivity of Jehoiachin, and also the conquest of Egypt in the succeeding year, by Nebuchadnezzar; the future restoration of Israel and Judæa from their several dispositions, upon their repentance and reformation; and their ultimately happy state after the advent and under the government of the Messiah. The predictions of Ezekiel are distributed by Josephus, and various other writers, into two books, or parts; the first of which extends to the close of the 39th chapter; and the second, in which a new, more elevated, and joyful force is exhibited, begins with the 40th chapter, and is comprehended in the last nine chapters. Prophets speaks in high terms of this prophet, observing, "that he had great erudition and genius; so that setting aside his gift of prophecy, which is incomparable, he may deserve to be compared with Homer, on account of his beautiful conceptions, his illustrious comparisons, and his extensive knowledge of various matters, particularly of architecture." Bishop Lowth, in his 21st lecture on the sacred poetry of the Hebrews, gives us an admirable description of the peculiar and discriminating characteristics of this prophet. "Ezekiel," says he, "is much inferior to Jeremiah in elegance; but is equal even to Isaiah in fulness, though their style of composition is very different. For he is bold, vehement, tragical, wholly intent on exagereation; in his sentiments elevated, warm, bitter, indignant; in his images fertile, magnificent, harsh, and sometimes most deformed; in his diction grand, mighty, sublime, rough, and sometimes uncultivated, abounding in repetitions, not for the sake of ornament or gracefulness, but through indignation and violence. Whatever subject he undertakes to treat of, he pursues it diligently; he remains entirely fixed on it, and rarely deviates from his purpose; so that his reader is scarcely ever able to discern the enfeé and connection of his matter. Perhaps he is excelled in other respects by most of the prophets; but none in the whole compass of writers has ever equalled him in the manner of writing, for which he seems to have been singularly qualified by nature, in force, impetuosity, weight, and grandeur. His diction is sufficiently periphrastic; almost all his obscurity lies in his matter: his visions are particularly obscure; and yet, as in Hosea, Amos, and Zechariah, they are interpreted by a narration, which is plain and altogether historical. The greater part of Ezekiel, and what lies in the middle of his book, is poetical, whether we regard the matter or the diction; but he is for the most part so rude and void of composition in his sentences, that I am often doubtful what to determine in this respect." In another place the same learned prelate remarks, that Ezekiel should perhaps be often classed among the orators than the poets; and he thinks that, with respect to style, he may justly silence to Ezekiel the name rank among the Hebrews that Aischylus holds among the Greeks. The most learned and elaborate commentary upon this prophet was written by two Spanish Jesuits, Pradus and Villalpandus, in three volumes folio, of which Dr. William Lowth has availed himself in his valuable continuation of Bishop Patrick's commentary on the Old Testament. The late and best version of Ezekiel is that of the late learned bishop Newcome, in 1788, in 2 vols. with a preface and notes, which Biblical scholars will peruse with advantage. Prideaux's Com. vol. i.; Lowth's Comm. Pref.; and Preface to Newcome's Com.

EZEKIEL'S ROLL, or ROD, a scripture measure, computed by the ancients to amount to 1 English foot 11 inches 3/4 of an inch.
EZRA.

Ezra, or Ezra, in Biography, a Jewish priest, author of the book that bears his name, and compiler of the Canon of the O. T., was a descendant of Seraiah, the high priest, who was put to death by Nebuchadnezzar at the capture of Jerusalem, in the year 587 B. C., and flourished about the year 458 B. C. He was probably born in the land of captivity, and acquired the respect and confidence of his countrymen by his distinguished learning, acquaintance with the scriptures, and zeal for the religion of his fathers. In the beginning of the 7th year of Artaxerxes Longimanus, or 458 B.C., Ezra received his commission to return to Jerusalem, with as many of his nation as chose to accompany him, for the purpose of reforming and settling the state, and reforming the church of the Jews, and of regulating and governing both according to their own laws. The extraordinary powers with which Ezra was invested seem to have been conferred upon him by the influence of Esther, who was at this time in high favour at the Persian court. At the commencement of his journey he appointed a fast, with a view of recommending himself and his associates to the divine protection, and arrived at Jerusalem on the 1st day of the 8th month, having spent 4 whole months in the journey from Babylon thither. Having delivered up to the temple the rich offerings which had been made to it by the king, the nobles, and the Jews who remained in Babylon, and having communicated his commission to the king's lieutenants and governors throughout Syria and Palestine, he made no delay in the execution of it; and difficult and arduous as it was, he persevered during an interval of 13 years, till Nehemiah arrived with a new commission from the Persian court, to co-operate with him. From the advancement of Esther to the high dignity of queen in the court of Persia, and the protection and patronage thus afforded him, Ezra derived an encouragement to go on with the work of reforming and settling the Jewish church and state in Jerusalem, which he had undertaken.

We shall here observe that the date of the commission granted to Ezra in the 7th year of Artaxerxes furnishes the commencement of the 70 weeks of the famous prophecy, delivered in the 8th chapter of Daniel, concerning the advent of the Messiah, that these 70 weeks are weeks of years, and that the whole number amounts to 490 years, at the end of which the period marked in the prophecy expired; after which the Jews were no longer to be the peculiar people of God, nor Jerusalem his holy city, because then the economy which he had established among them was to cease, and the worship which he had appointed at Jerusalem was to be wholly abolished. All this was accomplished at the death of Christ. Accordingly, the end of these weeks being fixed at the death of Christ, we may easily calculate their commencement. The death of Christ, as most learned men agree, took place in the year of the Julian period 476, and in the Jewish month Nisan, when the Jewish passover was always celebrated; and, therefore, if we reckon 490 years backward, this will lead us up to the month Nisan, in the year of the Julian period 426, which were the year and the month in which Ezra had his commission from Artaxerxes, for his return to Jerusalem, in order to restore the church and state of the Jews. According to this interpretation of the prophecy, the words "to restore and build Jerusalem" cannot be understood in a literal sense. If this be the case, they must be understood of that rebuilding of Jerusalem, which was accomplished by virtue of the decree of Cyrus, in the first year of his reign, 536 years B. C.; but from this era to the death of Christ were 568 years; and, therefore, if the said 490 years be computed from thence, they will expire many years before the cutting off or the coming of the Messiah, both of which events ought to fall within the compass of them according to the words of the prophecy. But to return from this digression.

One of the first objects of Ezra's attention, after he had appointed judges and magistrates, was to induce the Jews to dissolve the marriages, which had been contracted by many of them in direct contradiction to the law of Moses, with wives from the families of their idolatrous neighbours. During the continuance of his government he faithfully employed himself in restoring the discipline and rites of the Jewish church, and the worship of the temple, according to the form in which it had existed before the captivity. But we must not omit to mention a very important measure which engaged the attention of Ezra, and to which he devoted his skill and industry; and this was the correction and revision of the books of the sacred writings. What he did in this respect towards forming a complete canon of the scriptures, has been already stated at large under the article Bible. Although Ezra's commission was superseded by that of Nehemiah, in the 20th year of Artaxerxes Longimanus, he continued, in concurrence with the new governor, to perfect the reformation which he had begun. When he had completed his revision of the scriptures, and had them written out in the Chaldaean character, he made preparation for publicly reading the law of Moses to the people at Jerusalem. The day appointed for this purpose was the first day of the feast of trumpets, when the commencement of the new year was joyfully celebrated. Having ascended a scaffolding, which had been erected in the most convenient part of the city, and being attended by 13 of the principal elders of the people, he began to read the law out of the Hebrew text, and some of the Levites, previously instructed and appointed for this purpose, rendered it into Chaldee, which was then the vulgar language of the people; and he proceeded thus, day after day, during this festival, and also that of tabernacles, till the whole law was finished. Nehemiah and Ezra, at the close of this solemn business, by which the minds of the people had been much impressed, proclaimed a fast, in order to give them an opportunity, and also incitement, for a public and solemn confession of their sins, and for entering into engagements of future obedience to the laws which had been explained to them.

The subsequent events of Ezra's life are not recorded. Josephus says that he died at Jerusalem; but other Jews affirm that he returned to Persia, and died there, in the 120th year of his age. Many fables have been related concerning him in the writings of the Talmudists, and they have been borrowed by the Mahometans; but they are not deserving of recital. Several of them may be found in Herbelot's "Bibliotheque Orientale," under the articles Ozain, and Ben Seraiah.

The book of Ezra was written by him, partly in Hebrew, and partly in Chaldee, vizi, from the 8th verse of the 4th chapter to the 27th verse of the 7th chapter; and contains the history of the Jews from the time of Artaxerxes's, or, as others say, Cyrus's, edict for their return, to the twentieth year of Artaxerxes Longimanus. It specifies the number of Jews who returned, and Cyrus's proclamation for re-building the temple, the obtrusion it met with, and the finishing thereof in the reign of Darius. It is canonical, and allowed as such both by the church and the synagogue.

The books of Ezra, called in the English version, "the First
E I E I A.

First and Second Books of Esdras," though held by some, particularly the Greeks, for canonical, are thrown by the English church into the number of apocryphal books, being only extant in Greek. These have been decorously rejected from the canon as impious productions, confuting of combined extracts from the genuine book of Ezra, rabbinical fables, and the dreams of some Christian visionary. The Jews ascribe to Ezra the book of Nehemiah, but this opinion is contradicted by Nehemiah's own declaration at the beginning of it, and by his always speaking of himself in the first person, Some have also conjectured that Ezra was the author of the book of Esther, which see; many however, with greater probability, attributed it to the compilation of the two books of Chronicles; and others have said that he was the writer of the two books of Kings. Prideaux's Com. vol. ii. Du Pin.

F.

The sixth letter of the alphabet, and the fourth consonant.

The letter F may be either considered absolutely, and in itself, or with regard to the particular languages where it is found. In the first view, F is generally placed by grammarians among the semi-vowels, and distinguished in the enumeration of the alphabet by a name beginning with a vowel; though it has to far the nature of a mute that it is easily pronounced before a liquid in the same syllable. Joh. Conrad. Amman (in his Difertatione de Loquela) divides the consonants into single and double, and the single into hinging and explosive. Among those called hinging, there are some pronounced by the application of the upper teeth to the lower lip; and these are the F and ph. The reason why some account the F a semi-vowel, and Amman places it among the hingers, is, that one may pronounce a little found without any other motion of the organs than what is necessary to the pronunciation of the F.

In English its found is invariable, being formed by compression of the lips, or a junction of the upper teeth with the under lip, and a forcible breath.

This letter is derived to us from the Romans, by whom it was borrowed from the Aeolians, who, having no rough breathing, invented this character, or rather borrowed it from the oriental tongues; among the Aeolians it is called digamma, or double gamma, as resembling two F's, (gammus;) one over the other. The Latins used this great F instead of Ω, hence the Aeolians, and the Latins after them, write F for conform, viam, and Fappa for xappa, uspeva, and F for aum, aumum. (See Letter E.) The aspirate, says the ingenious writer, cited under that article, instead of vanishing on the principle there stated, was changed into a labial letter, ω, φ, b, or c. The digamma, however, did not always originate in a guttural, but sometimes in consonants allied to our s or y. The digamma, says the same author, did not belong, as Dr. Bentley and others supposed, to the Aeolic dialect only, but to all the dialects of Greece in their more ancient mode of pronunciation; and he observes, in opposition to the opinion of the learned, who say that the digamma at first prevailed, and was afterwards succeeded by the aspirate, that the gutturals at first prevailed, which were softened into mere aspirates, and that these were again changed for a more easy and agreeable letter, which being simply a labial, was diversified by different people into ω, ω, υ, ι, b or f. In contradiction to this very plausible theory, it may be alleged, that the digamma is to be found only in Homer, the most ancient writer of Greece, while the aspirate occurs in all the more recent authors. To this objection it is replied, that the use of the aspirate obtained in the written language, and was, therefore, less susceptible of corruption; on the other hand, that of the digamma prevailed in pronunciation, which was more liable to change, and to deviate from the original terms. Homer, we may naturally suppose, adopted the first in composing and writing his poems, and the last in reciting them to the people. The written form, we may assume, was at first used but little, but prevailed by degrees, while the peculiarities of pronunciation in their turn began to decline. The language, as written by Homer, at length became fashionable in the conversation of polished people; and the aspirate being thus triumphant in the daily converse of learned men, would of course in their writings triumph over oral and temporary corruptions. The preservation of the aspirate in the written poems of Homer, while the digamma was used in reciting them, is proof that Homer did actually use a written language, and that his works were preferred by a written language; otherwise the aspirate would have been lost, and the digamma alone would have prevailed in all the Greek authors who followed. If an editor of Homer in modern days would insert the digamma, he would corrupt the original orthography of Homer, and subvert, in the room of the original characters, the corruption of pronunciation.

Mr. Jones further observes, that the change of a guttural into an aspirate, or into a long vowel, or into a labial letter, called the digamma, is not peculiar to any one language, but is founded in the structure of the organs of speech; and instances of it prevail in all tongues, both ancient and modern. We may further add, that the digamma seems in its origin to have been no other than the Greek ω, which being made at three strokes, degenerated at length into the figure F. For the letter ω being compounded of an omicron with a perpendicular drawn through it, if that perpendicular be made first, and the O at two strokes afterwards, viz. first the upper, then the under part, it may happen, especially in writing full, that the two parts shall not join; and even instead of two arches of circles, half and convenience may naturally enough make two straight lines.

What confirms this transformation of the ω into F, is, that...
that on the medals of Philip, and the kings of Syria, in the words ΕΙΒΑΝΟΥΣΕ and ΦΙΑΛΑΣΕΝΟΥ, the φι is frequently seen in the form just mentioned; i. e., it has no circle or omissor; but across the middle of the perpendicular is a kind of right line, formed only of two dots, the one on the right side, and the other on the left, representing a crook. Such appears to be the origin of the letter F, which of consequence is no other than a corruption of the Greek φ; and accordingly, on the medals of the Falsiens, the F is ordinarily put in lieu of the Greek φ: but it must be added, that though the Greek and Latin letter were thus the same thing, yet the sound was much softer among the Latins than among the Greeks, as was long ago observed by Terentianus.

The Romans for some time used an inverted F 3, in lieu of a V confound, which had no peculiar figure in their alphabet; thus, in inscriptions we meet with TERMIN-NA, DIJ, &c. According to Luhis, in his Comment on the Annals of Tacitus, lib. xi. Covarrvus and Dauinquis, this inverted digamma ʌ was first introduced by the emperor Claudius. See Tacit. An. lib. xi cap. 4. and Suet. in Vit. Claud. cap. 41.

It may be added, that the pronunciation of the F is almost the same with that of the V, as will be evident by attending to the manner of pronouncing the following words: Favour, Vanity, Felicity, Vice, Foment, Vague, &c.

The French, particularly, in borrowing words from other languages, usually turn the v into an f, as chêfif, neuf of nouns, nef of naves, &c.

In the latter Latin writers we find the Latin F and Greek φ frequently confounded; as in Falaux for Phalanx, Philosophia for Philopha, &c. which abuse is still retained by many French writers, who write Philophic, Philipe, Epiphane, &c. and even sometimes, by the English as in fancy, filet, &c. &c.

F, in the Calendar, is the fifth dominical letter.

F, in the Civil Law. Two f's joined together signify the Pandects: see the reason of this under Pandect.

F, in our Ancient Customs, was a flagma or brand.

He that shall maliciously strike any person with a weapon in church or church-yard, or draw any weapon there with an intent to strike, shall have one of his ears cut off; and if he have no ears he shall be marked on the cheek with a hot iron having the letter F, whereby he may be known for a fray-maker, or fighter.

F, or Fa, in Music, denotes the baf-clef, being placed on the fourth line upwards.

Indeed the character or sign by which the f and c clefs are marked, bore no resemblance to thote letters. Mr. Malcolm thinks it were as well if we used the letters themselves; but custom has carried it otherwise. The ordinary character of the F or baf-clef is ʒ, which Kepler takes a great deal of pains to deduce by corruption from the letter F itself.

F, in the Italian Music, is often used instead of force.

F, in Medical Prescriptions, stands for fit, very strong, or loud.

F, in Medical Prescriptions, stands for fit, let it be done, as F. S. A. denotes as much as flat secundum artem.

F, among such as give us the numeral value of letters, signifies 40, according to the verse

"Sexta quaterdenos gerit que diflat ab alpha."

And when a dash was added over it ʃ, signified 40,000. F, on the French Coins, is the mark of the town of Angers.

FAA, in Solmization, is always the fourth sound of each hexachord, as do, re, mi, fa.

F, Fa, Ut, in the scale of Guido, is the note which occupies the fourth line in the baf, on which the clef is placed: fa implies the fourth in the natural hexachord of C, and the fit the first note of the moll hexachord.

Fa Feint, in Old Music, implied F ʌ; and any note not in the regular hexachords, whether flat or sharp, was said to be a feigned or fictitious note.

Fa Pictum, Latin, or Fa Finte, Ital. in Old Musical Language, implied F ʌ. See Fa Feint.

FABORG, in Geography, a sea-port town of Denmark, on the south coast of the island of Funen, situated in a flat but fertile country. Its harbour is not good; it principally trades in provisions. N. lat. 55° 6'. E. long. 10° 16'.

FAAS, a town of Hindoostan, in Dowkatabad; 5 miles S. of Amediagour.

FABA, in Botany, see Zygophyllum, the common or broad bean. Jussi. 560. Tourn. t. 212. Jullien separates this as a genus from Victa chiefly on account of the vertical, not lateral, insertion of the seeds, whose face or bilum is terminal. There are several species, and their fowt crek habit, fo different from that of Victa, confohances the mixture. Even Ieipter however, fo critical in differences in fruit, has not adverted to this, and the general opinion is in favour of Linnumus who combines the two. See Victa.

FABA Bengalensis, in the Materia Media, a roundish compressed substance, about an inch in diameter, brought from Bengal, and thought to be a vitiated fruit of the myrobalans kind. It is a very good astringent, and has been successfully prescribed in fluxes and hemorrhages.

FABA St. Ignatii. See Strycnos.

FABA Purpureus, the fruit of a species of ricusus. See Palma Chusfi and Castor-oil.

FABACIUM, a word used by the ancients to express a sort of food then in use, which was a kind of cake made of bean-meal.

FABAGO, in Botany, see Zygophyllum. The name alludes to the thickening and shape of the leaves, resembling the feed-lobes of a bean.

FABULIS Lapis, in Natural History, a fione mentioned by many ancient authors of repute as found in the river Nile, of the shape of the common bean, and of a black colour. They say it had the virtue of curing demence, and that dogs durst not bark if it was laid before them. Thofe, and many other like virtues, are attributed to this fione, to the great disgrace of the fofher authors who relate them. The fme fions have been of thofe extraneous folsils which Dr. Hill has fiyed ichthyperia, from their having been formerly parts of the bony palates of fhes which feed on the fsh-fish kinds; and other authors filiqua, ftrom their refebling the pod of the lupine or bean.

FABARIA, in Botany, a name given by some authors to the telephium or orpine, and by which it is in some places called in the hops.

FABARIA Calendria, among the Romans, the calend of June, so called because the beans being then full ripe, some of them were offered to the goddesses Carth, the wife of Janus.

FABARIS, in Ancient Geography, Farfa, a river of Italy, called by Ovid Farfarus, which had its source at a small distance to the east of Carpelia, at a place now called "Capo Farfa," and pursuifing a wederly course, discharged itself into the Tiber.
FAB

FABATARIUM, among the ancients, signifies, according to some, a large vessel in which beans were kept; others will have it to have been a kind of dish or plate into which bean-pulse was put and offered to the household gods.

FABER, Henry, in Biography, published an elementary tract on music, (Ad Musicam Practicam Introductio, mulibus,) 1571, in which the scale in the harmonic or Guidonian hand is better arranged than in any other book of the kind that we have seen, by placing a clef at the top of the three middle fingers, as beacons or landmark, and making each finger the representative of a tetrachord. See plate, History of Music, vol. ii. p. 95.

Faber, Gregory, published at Basile, in 1552, "Musicæ Practicæ Exegetum," in two books, octavo, containing 230 pages; which, when they were written, could have been but of small use to a student without the colloquial commentary of a master: its only value, indeed, now is, that it contains compositions of Julquin, Brumel, Ockerheim, and other musicians of that time.

Faber, Jacobus Stapulensis, or James Leefare, born at Elystan in the Boulognois, and who flourished about the beginning of the 16th century, was an able mathematician, and one of the few writers on music which France could boast of at that early period. He was educated at Paris, and with a view to further improvement, he travelled through various parts of the world, that he might have an opportunity of conversing with the learned.

On his return to France, he declared open war against the Scholastic philosophy, and attempted to introduce genuine Aristotelianism, as well as to disseminate a taste for mathematical learning. Besides several theological works, he wrote commentaries upon the dialectics, physics, politics, and economics of Aristotle. Of these commentaries one of his contemporaries says, "Faber has rendered the Peripatetic doctrine so clear, that we have no longer any occasion for Ammonius, Simplicius, or Philoponus." Another says, "Faber was the first among the French, as Cicero among the Romans, who united philosophy and eloquence." The boldness with which he opposed the corruption of philosophy brought upon him a fupicion of heresy, and the persecution of the doctors of the Sorbonne; but he found a secure asylum in the court of Margaret, queen of Navarre, where he is said to have lived to the age of 105 years; and where he died while veering between Protestant and Catholic. His chief works were theological, but his name is preferred by Protestants as a musical writer, and author of an elementary treatise on the art, (Musicæ Liturgiæ Quatrain Demonstrata,) under the title of "Jacobi Fabri Stapulensis Elementa Musica," ad Clerumium Virum, Nicolaum de Haquevillæ, &c." Paris 1496 and 1552. Zardin mentions him by the title of "Il Stapulense." He is said by Bayle to have died at Nîmes (where the king of Navarre held his court in 1537) at near 100. Bayle, who says nothing of his musical work, has been very diffuse on his polemics, calls him a bit of a man, "c'est un petit bon d'homme," with a perturbed spirit, who attacked his friend Erasmus in an unhandsome manner; in which controversy he lost reputation, and proved himself to be neither Catholic nor Protestant.

His musical demonstrations, in a small 4to. only 44 leaves, begins by a lift of the Greek founders and writers on the science, and the wondrous wonders of its effects; followed by an edict on his matters, Labinius and Turbilius.

He gives a lift of all the ancient writers on music, Greek and Roman, from Aristoxenus to Boethius, but appears to have read none of them, except Boethius, whose treatise he seems merely to have abridged. Salmas says that he undertook other parts of mathematics better than music. His tract is solely confined to harmonies, and was admired in his own time, because he had no rivals; but so frequently has the subject of harmonics been treated since by mathematicians of a superior order, that this is only valuable for its age and scarcity. He takes notice of the Consensus Conclutum against Timotheus, but he has given us no copy of it, nor does he mention any other notation used by the Romans, in the time of Boethius, than that of the Greeks. There are seventeen or eighteen musical notes and musical writers recorded by Walker in his musical dictionary of the name of Faber, and Lefebvre, and as neither music nor precepts of any use are come down to us from their labours, we shall let them go gently down the stream of oblivion, without endeavouring to check their course, or applying to the humane society.

Faber, John, was born at Halibron, on the Neckar, about the year 1500; the circumstances of his early life have not come down to us, but we find him belonging to the Dominican order, and a doctor in theology at Cologne; after which he went to reside at Augsburg, where he acquired considerable reputation as a preacher and writer against the Protestant doctrines. His writings are chiefly polemical, among which is "Francus quibus dignofentur Hereticon," a work highly regarded by the Catholics of his own day on account of the facts, or perhaps fables, which it details concerning Luther. He wrote also in the German language "An illustration of the Prophecy of Joel," and a collection of prayers compiled from the scriptures and the works of St. Augustine. Moreni.

Faber, John, surnamed from his own principal work, "Malleus Hereticorum," was born at Leukirchen, a town of Sualia, towards the end of the 15th century; he was zealously attached to the cause in which he had been educated, and was admitted to the degree of doctor in theology. In 1518 he was appointed by the bishop of Constance, his official, and in the following year his vicar-general, and in that character he was appointed to examine the tenets of Zwingli and his fellow reformers in Switzerland. In this business he sought out all the fables, modes, and censures of modern and ancient, polished and unpolished. He was of the opinion that Luther, with his sect, is the true heir of the heretics. His work was published as a condemnation of the sect of Zwingli and his followers, and was considered as the most important work of its kind. It was printed in Latin and published in several editions. The work was well received in the Roman Catholic church, and was considered as a valuable contribution to the study of the Reformation and the Counter-Reformation. The work was reprinted in various editions, and was widely circulated among the clerics and theologians of the time. The work was well received in the Roman Catholic church, and was considered as a valuable contribution to the study of the Reformation and the Counter-Reformation. The work was reprinted in various editions, and was widely circulated among the clerics and theologians of the time. The work was well received in the Roman Catholic church, and was considered as a valuable contribution to the study of the Reformation and the Counter-Reformation. The work was reprinted in various editions, and was widely circulated among the clerics and theologians of the time.
FABER, Horatio, was born in the year 1626, at a period when the scholastic philosophy declined. He was professor of mathematics and philosophy at Lyons, and wrote upon philosophy, logic, and physics. He implicitly followed neither the Scholastics nor the Aristotelians, but borrowed light from modern philosophers, particularly the Cartesian. His innovations, however, brought him under a strong suspicion of heresy, and produced little effect.

FABER, Pierre-Jean, a physician of the faculty of Montpellier, and the author of numerous works relative to medicine, surgery, and chemistry, published chiefly between the years 1624 and 1626, at Toulouse. Little more is known respecting him, than that he practised his profession at Ciefaudary, in Languedoc, with great reputation; so that he was frequently sent for to the cities of that province, especially to Toulouse. The titles of his treatises will be found enumerated by Eloy. In one of these, "Infigens Curationes Variarum Morborum, Toulou, 1627," he informs us that he succeeded in curing a rich and noble young lady of an hysterical disease, mixed with occasional attacks of epilepsy, and that he married him in reward of his services. Eloy Dict. Hist.

Several physicians of the name of Faber, of left note, are mentioned by Margetus and Eloy; one of whom, named Albert, after having practised his profession at Lubeck about the year 1641; and subsequently at Hamburg, became physician to Charles II., to whom he dedicated his only work, written in English. A Latin translation of this work is extant, under the title of "Practica recentissimo de Auro potabile medicinis, ubiqui virtute," printed at Francfort in 1673. He survived his royal master but one year, having died in 1686.

FABER, in Ichthyology, the English Dover, a species of Zeus; which see. Also, a species of Chesebund; which see.

FABIAN, Robert, in Biography, an English historian, born in London in the 15th century, and brought up to active business in the pursuits of commerce he was so distinguished as to be chosen sheriff of the city in 1493. His leisure hours were devoted to literature, and particularly to the study of history. He employed himself in compiling a chronicle, which was printed after his death, entitled "A Concurrence of Stories." It is divided into seven parts, of which fix refer wholly to the history of England previously to William the Conqueror; the seventh brings the English and French histories down to the reign of Henry VII. He is copious in the affairs of London, in which the work is chiefly valuable, and on that account it is called by Stow "a painful labour, to the great honour of the city and the whole realm." To each of his books are prefixed a metrical prologue and other pieces in verse, which led bishop Tanner to style him, "poeta haudi medicinae ingenii." His chronicle was printed in the year 1516, four years after the author's death. Biog. Brit.

FABIAN, in Geography, a river of Louisiana, which runs into the Mississippi. N. lat. 39° 31'. W. long. 91° 47'.

FABIANUS, Fabius, in Antiquity, a part of the Luperci. These priests consisted of two colleges, the tril of which was called the Fabii, and the second the Quintii, from their respective chief. The Fabii were for Romulus, and the Quintii for Remus.

FABIANUS, Papryrus, in Biography, an intelligent naturalist, who lived in the reign of Tiberius, and wrote a treatise "On Animals." Pliny calls him "naturn rerum peritus." He is also mentioned by Seneca and other writers. Le Clerc, Hist. de la Med.

FABIANUS, pope, was a native of Rome, to the bishopric of which he succeeded in the year 236. He prevailed in that high station till the year 259, when he fell a martyr to the Decian persecution. He is characterized by St. Cyril as "an excellent man, the glory of whose death had answered the purity, holiness, and integrity of his life." According to Tilmont, and others, a great part of Gaul was indebted to Fabianus for its knowledge of Christianity, which was taught by the bishops that he trained up and sent out in millions for the propagation of religion. Morei.

FABIO, Socrates, in the year 1750, was leader of the opera band at Naples; a musician who knew and performed his business admirably. As his name or his merit can be little known in England, he would not perhaps have been recorded here but to relate a circumstance which did him honour, in our opinion, at Naples, but which in England would have degraded him to the rank of a ticket-porter. Having been invited to dine with a gentleman who loved music, we observed that he was so obliging and so humble as to bring with him his violin. It is very common in the great cities of Italy to see performers of the first eminence carry their own instruments through the streets. This seems a trivial circumstance to mention, yet it strongly marks the difference of manners and characters in two countries not very remote from each other. In Italy, the leader of the first opera in the world carries the instrument of his fame and fortune about him, with as much pride as a soldier does his sword or musquet; while, in England, the indignities he would receive from the populace would soon impress his mind with shame for himself and fear for his instrument.

FABIIUS, MAJIMUS, Q. an eminent Roman commander, whose history and deeds are incorporated with that part of his country's annals which are devoted to the period in which he flourished. He was master of the horse to the dictator Papirius, who, jealous of the superiority of an inferior officer, fought revenge in the death of Fabius; but having escaped, he was himself made consul five times, and rendered his country very signal services. In the year B.C. 304, he served the important office of censor, and reformed an abuse introduced by Appius Claudius, who, to obtain influence in elections, had distributed a great number of freedmen, and perions of the meanest condition, among the country tribes. These Fabii incorporated into four tribes, and thus nearly destroyed their influence. On this account he received the appellation of "Maximus," which was made heretidary in his family. The victories which he obtained were very numerous, and many of them of the utmost importance to the welfare of Rome; for that over the Gauls and Sammites he obtained a triumph. He afterwards gave a signal proof of the love which he bore his country, by opposing the elevation of his son Fabius Gargues to the consulship, because he deemed him to be insufficient for the office, from habits of intemperance. Gargues was, however, chosen; and, marching against the Sammites, underwent a severe defeat. The father immediately went out as lieutenant to his son, and by his valor rescued him, and obtained a signal victory over the enemy. Further successes crowned their exertions, for which Gargues, as consul, was decreed a triumph. The joyful parent followed the triumphal car on horseback, and was hailed by the citizens as their great champion and deliverer. This was the conclusion of his military exploits. He was again nominated dictator in the year B.C. 287.

FABIIUS, MAJIMUS, Q. surranged the Conclator, on ac-
count of his great prudence in war, was either the grandon
great grandson of the former, or attained the honour of
the confiduhipt for the first time in the year B.C. 233, when
he obtained a triumph for a victory over the Ligurians. In
his youth he had displayed very moderate talents; the meek-
ness of his disposition, and the gravity of his manners, were
imputed to vaunt of character; it was, however, afterwards
discovered that he had been diligently laying up stores of
civil and military knowledge. When he was content
the second time he had to contend with the great Hannibal,
and to his skill, and well-timed caution, the safety of the
flate was owing. His plan was to hazard nothing, but to
hover round the enemy, watching his motions, cutting off
his supplies, and perpetually harrying him with small
detachments, while he himself, with the main body, remained
in pursuit of safety. This conduct, though the bell
that could be adopted, was very displeasing to the Romans, who
called him to the city, and refused to ratify a convention
for the mutual exchange and ransom of prisoners, which he
had made with Hannibal. To enable him to make good
his engagements, he ordered his own lands to be sold, and
thus raised a sufficient sum of money to answer the pur-
pose.

On departing from the army, he gave orders to Minucius,
his master of the horse, not to risk a battle; but, regardless of
the command, he attacked the enemy, gained some ad-

cantages, and was raised to an equal rank with Fabius. In
a short time he was attacked by Hannibal, and would have
been entirely cut off but for the prompt assistance of Fabius.
"Oh this occasion," says the historian, "whatsover honour
Minucius might lose as a general, he recovered as a man.
At the head of his soldiers he returned thanks to Fabius for
his deliverance, called him father, and resigned mollying
his authority into the hands of the dictator." Fabius
embraced him as his friend, and continued him in the post of
master of the horse. When his dictatorship expired, he left
his example and advice to the consul P. Aemilius, who, not
being able to restrain the raillery of his colleague, Varro
fulfilled a defeat at the fatal battle of Cannae. Aemilius,
when at the point of death, required a friend to acquaint
Fabius that he had never ceased to follow his counsel, and
was innocent of the misfortune. This disdained justitied
the caution of Fabius, and gave him a just and high præ-
eminence in the state. In the fulfifhnt years of warfare he
was three times consul; but his most considerable action
was the recovery of Tarracum, which had been lately given
up to Hannibal. His successes here was fullied by a much
severer slaughter of the defenders, and by great terror
wixed towards the inhabitants, who were fold for slaves, after
they had been stripped of their wealth. While Fabius was
collecting with great care all the gold and silver for the public
treasury, he was regardless of the admirable specimens of the
fine arts which abounded in that Cretian colony; and being
asked what should be done with them, he replied, "Let
us leave to the Tarentines their angry gods." Fabius lived to
an old age, and was much disconcerted at the successes with
attending the measures of Scipio against Hannibal, though
he did not live to witness the triumphal close of the war.
His son who was then consul died before him, for whom he
himself pronounced a funeral oration. By Emnius, Fabius is
described as

"Unus qui nobis constando remint."  

And by Cicero he is represented as not less useful in the
toga than at the head of the army. Univer. Hist.

FABUS, in Geography, one of the military townships in
Onondago, New York; in which is a post-office, and con-
taining 844 inhabitants.

FABLE, a tale or feigned narration, designed either to
instruct or divert; or, as Mont. de la Motte defines it, an
instruction disguised under the allegory of an action.

Fable seems to be the most ancient way of teaching; the
principal difference between the eloquence of the ancients
and that of the modern consuls, according to Père Boiffin,
in this, that our manner of speaking is simple and proper,
and theirs fall of mysteries and allegories: with them the
truth was usually disguised under those ingenious inventions,
called, by way of excellence, pan, fabula, fabula; that is,
words, as intimating that there was the same difference be-
tween these fabulous discourses of the learned and the com-
mon language of the people, as between the words of men
and the voices of beasts.

At first fables were only employed in speaking of the Di-
vine Nature, as then conceived; and the ancient theology
was all fable. The Divine attributes were separated, as it
were, into so many perfections, and all the economy of the
Godhead laid down in the sagacious relations and actions
thereof; either because the human mind could not conceive
so much power and action in a single and indivisible being
or, perhaps, because they thought such things too great
and high for the knowledge of the vulgar; and as they could
not well speak of the operations of this Almighty Cause
without speaking likewise of its effects, natural philosophy,
and at length human nature, and morality itself, came thus
to be veiled under the same fabulous allegoric expression
and hence was the origin of poetry, and particularly of epic

The critics, after Apthorbus and Theon, reckon three
kinds of fables, rational, moral, and mixed.

FABLES, Rational, are called also parables; these are rela-
tions of things supposed to have been said and done by
men, and which might possibly have been said and done,
though in reality they were not. Such in the sacred writ-
ings, are those of the ten virgins, of Dives and Lazarus, the
prodigal son, &c. Of these rational fables we have likewise
about a dozen in Plutarch. See Parable.

FABLES, Moral, called also apologicals, are those wherein
not only brutes, but trees, and other animate fabulances,
are introduced as actors and speakers. These are also called
Ethic fables; not that virtue was their inventor, for they
were in use long before him, etc., in the times of Homer and
Heioi, but because he excelled in them. Such was Jo-
than's fable of the trees, the most ancient of any that are
now extant. See Apologue.

The rational foints from the moral fable in this, that
the former, though it be feigned, might be true; but the
latter is impossible, as it is impossible for brutes or focks to
speak.

FABLES, Mix. d., are those composed of both parts, ra-
tional and moral, or wherein men and brutes are introduced
covering together. Of these we have a fine instance in
Julian, lib. xxxii. cap. 4. made by a petty king to alarm the
ancient Gauls against the Massilians, who, arriving out of
Asia into Spain, charmed with the place, begged leave of
the inhabitants to build a city. To this effect: A bitch
dog with young begged of a shepherd a place to lay her
whelps in; which when she had obtained, the father begged
for leave to see them there. At length the whelps being
now grown up, depending on the strength of her own fam-
ily, she claimed the property of the place. So the Massi-
lans, who are now only strangers, will hereafter pretend to
be natives of this country.
As to the laws of fable, the principal are, 16. That to every fable there be some interpretation annexed, to shew the moral fende or design thereof. This interpretation, if it be placed after the fable, is called explication, or affiabilatio; if before it, explication, prefafabilatio. 2. That the narration be clear, probable, short, and pleasant. To preserve this probability the manners must be exprefled and closely kept to, as in poetry. See Probability and Manners.

M. de la Motte has some fine remarks on the subjed of fables, at the beginning of his "Fables Nouvelles, dediees au Roi, 1119."

"A fable, according to this polite writer, is a little epic poem, differing in nothing from the great one but in extent: and that in being left confined as to the choice of its perfons, it may take in all sorts at pleasure, as gods, men, beasts, or genius, or even, if occasion be, create perfons; i.e. personify virtues, vices, rivers, trees, &c. Thus, M. de la Motte very happily introduces virtue, talent, and reputation as perfons making a voyage together. See Exposition and Personifying.

That author suggests two reasons why fables have pleased in all ages and places. The first is, that self-love is spared in the inftruction. The second, that the mind is exercised by the allegory. Men do not love direct precepts; but proud to confideed to those philosophers who seem to command what they teach, they require to be inftructed in a more humble manner; they would never amend, if they thought that to amend were to obey; add, that there is a fort of activity in the mind which must be humoured; it pleafes itself in a penetration which difcovers more than is known; and in apprehending what is hid under a veil, fancies itself in some meafure the author of it. The fable muft always imply or convey fome truth; in other works, delight alone may fuffice, but the fable muft inftruct. Its effence is to be a symbol, and of conféquence to dignify fomewhat more than is exprefled by the latter. This truth should for the generality be a moral one; and a feries of fictions conceived and comphed in this view would form a treatise of morality prefirable to any more direct and methodical treatife; accordingly, Socrates, we are told, had a defign to compofe a courfe of morality in this way. This truth should be concealed under the allegory, and, in firithefs, it ought not to be explained either at the beginning or end.

The truth or idea intended should arife in the reader's mind from the fable itfelf. However, for the conveniency of the lefs diftinguished readers, it may be a good way to point out the truth or moral in preficient terms. To have the moral at the end of the fable seems much better than at the beginning; the mind is apt to be forfaddled in the later cafe: I carry the key along with me, fo that there is no room to exercise my mind in finding any thing myfelf.

The image, M. de la Motte observes, muft be juft, and express the thing intended directly, and without any equivogue; it muft be one; i.e. all the parts muft be visibly accessory to one principal end; and it muft be natural; i.e. founded on nature, or at least on opinion.

The writers of fables are not many. If there were any before Aesop, who lived in the time of Solon, about the fifty-second Olympiad, his fcenees have quite effaced their memory; and even occasioned all the good things of that kind to be afcribed to him. His life, as written by Pausanias, is itfelf a thorough fable. It muft be owned to be very happily imagined to make the inventor of fables a flave, and his mother a philofopher: the flave has his master's pride and ill-humour to deal with throughout. His leffons were all contained in the fables them-

selves, and the readers were left the pleafure of discovering them.

It is generally allowed among the learned, that though the matter and invention of the fables be Aesop's, the turn and expreffion are not. The Greek is of Plutudes; and bad Greek it is, in the judgment of F. Vauflor, De Ludeca Diés. Some authors will have Socrates the author of the fables of Aesop; others attribute them to Solomon, and others to Homer. See Aesop.

Phædrus was a flave too, and a freed-man of Augustus; but he had the advantage over Aesop in education: he is only a fabulist, as he translates and corrupts. Though his fables be generally short, yet he is prolific compared with his author. His style, however, is always florid, his descriptions cope, and his epithets suitable: he frequently adds graces never dreamed of by the inventor, and everywhere enriches the simplicity of Aesop in the moft delicate manner.

Pilpay, another fabulist, governed Hindoostan a long time under a powerful emperor; but he was not the lefs a flave, for the prime mimisters of fuch princes are always more fober than the meafuted subjects. Pilpay comprized all his politics in his fables; and accordingly his work long continued the book of state, or the difcipline of Hindooftan. It was translated into Perifhan and Arabic, and fince into the modern languages. His fables, M. de la Motte observes, are rather famous than good; but he is the inventor, and the merit of invention will always compensate for many faults. His fables are often wild and artifical: and the collection is a fort of romantic fentiment of men and genius, compos'd in its kind like Cyrus or Orlando, where the adventures are continually thwarting and confufing with each other.

We lay nothing of the fables of Gabrias, or Babrias, Avieus, who lived towards the end of the fourth cenfury under the empire of Gratus, Abflemius, &c.

Among the moderns, the moft celebrated writers are Mefh. de la Fontaine and De la Motte; the firft of whom has pick'd out all the beft things in Aesop, Phædrus, and Pilpay, and giving them anew in French, with a delicacy and fimplicity peculiar to himfelf: and which, in the judgment of his countrymen, fets him even above Phædrus.

The latter, rather than content himfelf with what De la Fontaine had left, chooe to be an inventor. He has succeed. His fables are many of them very happy, though some think them too full of thought and reafoning. His verification is infinitely more correct than that of La Fontaine, and more suitable to the subjed than that of Le Noble.

We have likewise some fables much efteemed of Mr. Gay and Mr. Moore.

FABLE is also ufed for the plot of an epic or dramatic poem, or the action which makes the fubject of a poem or romance. See Poem, Drama, Epic, and Action.

The fable, according to Arifotle, is the principal part, and as it were the foul of a poem. It muft be condered as the firft foundation of the composition, or the principle which gives life and motion to all the parts. In this fene the fable is defcribed, "a difcoufe invented with art, to form the manners by instructions diguffed under the allegory of an action." The fable is perfect or imperfect, as the action which it relates is free or fo. For the requisite qualifications of this action, see Action.

The fable of every poem, according to Arifotle's division, is either fimple or impex. It is called fimple when there is no change of fortune in it; and impex, when the fortune
tune of the chief actor changes from bad to good, or from good to bad. The latter is thought to be the most perfect; probably because it is more proper to stir up the passions of the reader, and to incite him with a greater variety of accidents. The impex fable is, therefore, of two kinds. In the first the chief actor makes his way through a long series of dangers and difficulties, till he arrives at honour and prosperity, as we see in the story of Ulysses. In the second, the chief actor in the poem falls from some eminence of honour and prosperity into misery and disgrace. Thus, in the Paradise Lost, we see Adam and Eve falling from a state of innocence and happiness into the most abject condition of sin and sorrow. The most interesting tragedies among the ancients were founded on this last sort of impex fable, particularly the tragedy of Oedipus, which proceeds upon a story, if we may believe Aritotle, the most proper for tragedy, that could be invented by the wit of man. Mr. Addison, however, is of opinion, (Spectator, N. 297,) that this kind of impex fable, in which the event is unhappy, although it is the most perfect in tragedy, is not so proper for an heroic poem. Milton teems to have been well able of this imperfection in his fable, and has therefore endeavoured to remedy it by several expedients, particularly by the mortification, which the great adversary of mankind meets with upon his return to the assembly of infernal spirits, as it is described in a beautiful passage of the tenth book; and likewise by the vision, in which Adam at the close of the poem leaves his offspring triumphing over his great enemy, and himself restored to a happier paradise than that from which he fell.

The epic fable, according to Boffin, is confined to the rational kind; i.e. the actors and persons are to be gods and men; and yet it admits of great latitude; it may be either grave, Illusrious and important, or low and popular; either whole or defective, in verse or in prose; much epithetized, or brief; rehearsed by an author, or represented by actors on the stage; all which are so many circumstances which do not make any alteration in the nature and essence of the fable.

The characters that specify the epic fable are these: it is rational and probable; it imitates a whole and an important action; and it is long and related in verse; none of which properties afflict the nature of the fable, or make it less a fable than those of Aesop.

The fable, according to Aritotle, consists of two essential parts, viz. truth, as its foundation; and fiction, which disguises the truth, and gives it the form of fable. The truth is the point of morality intended to be insinuated; the fiction is the action, or words under which the instruction is covered.

To make a plot or fable, the first thing, according to the great critic just mentioned, is to pitch on some moral instruction to be exemplified.

L. e. I would exhort two brothers, or other persons, who have some common interest, to live in amity, in order to preserve it. This is the end of the fable, and the chief thing I have in view. In order to this, I endeavour to impress this maxim on our minds, that "ill understanding ruins families and kinds of society." This maxim is the moral or truth which is to be the ground of the fable; which moral truth is now to be reduced into action, and a general action to be framed from several single and real actions of such as were ruined by ill understanding.

Thus, e.g. I say, that certain persons united together for the preservation of something that belonged to them in common, coming to disagree, their division left them open to an enemy who ruined them: such is the first plan of a fable.

The action presented by this narration has four conditions; it is universal, imitated, feigned, and contains a moral truth under an allegory.

The names given to the several persons begin to specify the fable. Aesop uses those of brutes. Two dogs, says he, appointed to watch a flock, fall out, fight, and leave all open to the wolf, who carries off what he pleases.

If you would have the action more particular and render the fable rational, take the names of men. Pridamant and Oronce, brothers by a second ventur, were left very rich by their father's will; but disagreeing about the partition of their effects, they engaged themselves so far against each other that they took no care of their common interest against Citladder, their chief brother by the first ventur; which left, artfully ensnaring their quarrel, and feigning he had no view but to some moderate augmentation, which might be made him without opposing them, in the mean time, gets the judges on his side, and the other persons instructed with the affair, procures the will to be affirmed, and becomes entitled to the whole estate about which the brothers were at variance. Now, this fable is rational; but the names being feigned as well as the things, and besides, the persons being only of a private rank, it is neither epic nor tragic. However, it may be employed in comedy, it being a rule laid down by Aritotle, that epic and tragic poets only invent things, but comic poets invent both names and things.

So, Comedy, &c.

To accommodate this comic fable more to the mode and tale of the town, some Dobirks must be imagined to have been promised to Citladder; but her father, finding him disinherited by the will, changes his resolution, and will have her marry one of the rich, feelefs young brothers, whom the despirers, &c.

But to return. The action may be so disguised with the truth of history that there shall not appear any fiction at all.

To effect this the poet looks back into history for the names of some persons to whom the feigned action either really or probably did happen, and relates it under those known names, with circumstances which do not change any thing of the ground of the fable.

As for the fable, it matters but little whether the persons be called dogs, or Oronce and Pridamant, or Robert of Artois and Ralph de Neffe, or Achorus and Agamemnon.

Aritotle observes, that the fable of an epic poem should abound in circumstances that are both credible and astonishing; in other words, the fable should be filled with the probable and the marvellous. If the fable is only probable, it does not differ from a true history: if it is only marvellous, it is no better than a romance. The great secret, therefore, of heroic poetry, is to relate such circumstances as may produce in the reader at the same time both belief and astonishment. This is brought to pass in a well-chosen fable, by the account of such things as have actually happened, or at least of such things as have happened according to the received opinions of mankind. Milton's fable is a master-piece of this kind; as the war in heaven, the condition of the fallen angels, the state of innocence, the temptation of the serpent, and the fall of man, though they are very astonishing in themselves, are not only credible, but regarded by many as objects of faith. Another method of reconciling miracles with credibility is by a happy invention of the poet; as in particular, when he introduces agents of a superior nature, who are capable of effecting whatever is wonderful, and what is not to be met with in the ordinary course of things. Ulysses's ship being turned into a rock, and Aeneas's fleet into a flood of water-nymphs, though they are very surprising accidents, are nevertheless probable, when we are told that they
they were thus transformed by the gods. It is this kind of machinery which fills the poems both of Homer and Virgil with such circumstances as are wonderful, but not improbable, and do frequently produce in the reader the most pleasing passion that can arise in the mind of man, which is admiration. If we look into the fiction of Milton's fable, though we find it full of surprising incidents, they are generally suited to our notions of the things and persons described, and tempered with a due measure of probability. We should, indeed, except the "Limbo of Vanity" with his episodes of "Sia" and "Death," and some of the imaginary persons in his "Chaos." These passages are astonishing, but not credible: they are the description of dreams and shadows, not of things or persons. The appearance of probability is so absolutely requisite in the greater kinds of poetry, that AristoIote observes the ancient tragic writers made use of the names of such great men as had actually lived in the world, though the tragedy proceeded upon adventures in which they were never engaged, on purpose to make the subject more credible. In a word, besides the hidden meaning of an epic allegory, the plain literal sense ought to appear probable. The story should be such as an ordinary reader may acquiesce in, whatever natural, moral, or political truth may be discovered in it by men of greater penetration.

We shall devote the sequel of this article to some remarks on the fable of the Iliad, as being the finest plan of an epic poem in the world, and at the same time the most useful fyltem of the precepts of the art, it being hence that AristoIote was furnished with all his reflections: referring for other articles observations on the fable of those poems to which we have referred under the article Epic Poem.

In every direct undertaking the end is the first thing proposed; and by this the whole work and all its parts are regulated; consequently, the design of the epopeia being to form the manners, it is with this firt view the poet must begin. Now, the philosopher dwelling on virtues and vices in general, the instructions he gives serve equally for all fates and all ages; but the poet has a more immediate regard to his countrymen, and the prefing occasions of his fellow-citizens. On this view it is that he chooses his moral, which he is to inculcate into the people by accommodating himself to their peculiar customs, genius, and inclinations. See how Homer has acquitted himself in these respects.

He saw the Greeks, for whom he wrote, divided into as many states as cities, each wherein was a body apart, and had its government independent of the rest. Yet were these different states frequently obliged to unite into one body against their common enemies. Here were then two sorts of government too different to be commodiously treated in one poem; the poet accordingly recurred to two fables; the one for all Greece, considered as confederated together, only consisting of independent parts; the other for each particular elate, such as they are in time of peace, and without the firt relation. The firt is the subject of the Iliad, the second of the Odyssey.

For the firt kind of government all experience agrees, that the only thing which can render it happy, and its design successful, is a good understanding, and due subordination among the several chiefs that compose it; and that misunderstandings, a desire of sway, &c. are the inevitable bane of such confederacies. The fift instruction, therefore, that could be given them, was to let before their eyes the destruction of the people, and even of the princes themselves, through the ambition and discord of the latter. Homer, therefore, for the ground, or moral of his fable, chose this great truth, that the misunderstandings of princes ruin their states. "I flog," says he, "the wrath of Achilles, so fatal to the Greeks, and which destroyed so many heroes, occasioned by a disagreement between king Agamemnon and that prince."

To enforce this truth, he represents divers confederate states, first at variance and unprofitable; then reconciled and victorious; all which he thus includes in one universal action. Several independent princes league against a common enemy; he whom they choose as their leader affronts the bravest of all the confederates; upon which the offended prince withdraws, and refuses any longer to fight for the common cause. This misunderstanding gives the enemy so much advantage, that the confederates are ready to relinquish the enterprise. The disagreeing person himself becomes a traitor in the calamities of his allies, one of his chief friends and favourites being killed by the chief of the enemies. Thus, both parties grown wise by their own injury, are reconciled. Upon which the valiant prince, joining again in the war, turns the scale to his own party, and kills the enemy's chief.

Such is the firt general plan of the poem. To render this probable and more interesting, circumstances of time, place, perfons, &c. are to be added; that is, the poet looks into history or tradition for perrons to whom such actions may with truth or probability be attributed.

He pitches on the siege of Troy, and supposes the action to have paffed there. The brave, choleric character, he calls Achilles; the general, Agamemnon; the chief of the enemies, Hector, &c. To inanimate himself into his readers, he accommodates himself to their manners, genius, views, and to render his fable more interesting, makes his chief perfons, and those who remain victorious, to be Greeks, the fathers of thofe very people. The course of the work is filled up and extended with other useful lefions and instructs.

That the epopeia in all its glory is juftly and strictly a mere fable in the fame fene as the fictions of Efop are, is shown by B. Dofin, in a parallel between the fable of the Iliad and that of Efop already mentioned. The moral instruction is visibly the fame in both; fo is the fiction. All the difference lies in the names and qualities of the perrons.

Homer's are kings; he calls them Achilles, Patroclus, &c. and the general good to be preferred, he calls the Greeks. Efop, after his manner, gives his perfons the names of beasts; the dogs are confederated, the wolf is their enemy; and what Homer calls Greeks, Efop calls sheep. One says, that while the confederate princes were at variance, Hector rushes on the Greeks, and makes them pay dear for the folly of their overzeal (delirant reges, plectitur Achivii); but that the allies, brought by misfortunes to themselves again, re-unite, reproach Hector, and kill him. The other, that while the dogs are together by the ears the wolf falls on the sheep; and that the dogs seeing the havoc he makes, join together, drive him away, and kill him.

The two fables were capable of a full nearer resemblance. Homer has extended his by long speeches, descriptions, comparisons, and particular actions; that of Efop might be amplified after the like manner, without corrupting or altering it. It is necessary only to relate what came let the dogs at variance, and shew the rise of the fatal wrath in all its circumstances; to make fine descriptions of the plain wherein the sheep fed, and of some neighbouring wood where the wolf was sheltered; to give this enemy whelps to rear, make them follow their fire in search of prey, and describe
describe the carnage they made at divers expeditions. Nor should the genealogy of the heroes be forgotten; the vultures shall boast himself a descendant of Lycaon, and one of the dogs bespring in a direct line from Canica; which last would be the proper hero of the poem, as being hot, and apt to be enraged. He would represent the person of Achilles to admiration; and the folly of some Ajax, his cousin, would afford a good proof of divine extractions.

Nothing more were required to engage heaven in the caulis, and divide the gods; which, no doubt, have as much right in Æop's republic as in the states of Homer. Witness Jupiter's taking care to give a king to the nation of the frogs.

The reader has here field enough for an epopeia; if he have any thing of fancy and expression, and do but take care to repeat as often as Homer does,

Τοις ἀπαρμοσθησθαι περιτείχος φύεις

See Iliad and Odyssey.

FABOMIT LAKE, in Geography, a lake of Canada.

M. lat. 52° 23', W. long. 88° 15'.

FABRA, a town of Italy; 9 miles N.N.W. of Orvieto.

FABRAGAS, a town of Spain, in Catalonia; 13 miles west of Gérona.

FABRE, John Claud, in Biography, a French ecclesiastic, was born at Paris in the year 1688, where he received his education, and was admitted to the degree of bachelor in theology by the faculty of Paris. He afterwards filled the office of professor in several seminaries in France. He died at the advanced age of 85, highly regretted by his brethren and friends for his modesty, talents, and learning. He was the author of very many works, among which is a Latin and French dictionary, in 8vo. He gave a new edition of the historical dictionary of Richelieu in two vols. fol.; for the execution of some of the articles he was obliged to submit to exile for a few years. On his return he published a continuation of the ecclesiastical history of the abbé Fleury; and a translation of all the works of Virgil, accompanied with notes and dissertations. He gave also a prose translation of the fables of Phaedrus, and a commentary of M. d'Abbeville's history. Morei.

FABRETTI, Raphael, a celebrated antiquarian, was born of a good family at Urbino, in 1619. He studied jurisprudence in his native city, and after graduating he went to Rome, and became distinguished for his great erudition, and for his knowledge of state affairs. He was nominated to several diplomatical missions, in which he acquired much reputation. His leisure hours were spent in the study of antiquities, and particularly in the examination and collection of all the inscriptions, and ancient monuments discovered through Latium, for which purpose he traversed the whole of that province alone, and on horseback, leaving no part unexplored. In 1650, he published a work, "De Aquis et Aquaeductibus veteris Romae," which obtained for him high credit among the literati. His next work was a dissertation "De Columna Traiani," 1653, which contained the particulars concerning the naval and military establishments of the ancients. In 1669 was published at Rome his great work, entitled "Interpretationem Antiquarum Explicatio," of this, it has been said, "that it was the first collection which was not filled with fictitious inscriptions." The author died in the following year, universally regretted. His cabinet of ancient monuments was deposited in the old palace of the dukes of Urbino. Nov. Diet. Hist.

FABRI, John, a physician of distinction at Rome during the papacy of Urban VIII., was born at Baxberg in Franconia. He took the degree of doctor of medicine at Rome, where he settled himself, and afterwards became professor of medicine, and botanical to the pope. Fabri was particularly distinguished by his knowledge of anatomy and natural history, of both of which sciences he displayed an extensive knowledge, in his "Commentary on the Natural History of Mexico," written by Francis Hernandez. This work contains especially some curious facts relative to the anatomy of monsters, and to comparative anatomy. He is said to have been the first to oppose the generation of certain beings from putrefaction; and he described with great accuracy the manners of the men of low animals. He published also an essay "De Nardo et Ephthyono," in which he refutes some opinions of Scaliger.

FABRI HONORÉ, an industrious and learned Jesuit, was born in the diocese of Bollay in the year 1666 or 1667. He has for a long time held the chair of professor of philosophy in the college de la Trinité at Lyons; but in consequence of his profound knowledge of theology, he was called to Rome, where he was made a penitentiary. He died in that city on the 9th of March, 1688. He was a man of most extensive and universal knowledge, and studied anatomy and medicine with considerable ardor. He assumed the credit of the discovery of the circulation of the blood, and father Regnault, and other recondite persons, have supported his assumption, on the grounds that he had maintained the fact of the circulation in a dissertation in 1638; but Harvey had published his discovery in 1628.

The works of this Jesuit consist of an apology for the Peruvian bark, in answer to Plempius, which he published at Rome in 1655, under the title of "Pulvis Peruvianus Feveribus Vindicus," and two other essays, one, "De Plantis, et Generatione Animalium," the other, "De Homine," published at Paris in 1666, and at Neurenberg in 1677.

FABRILANO, Gentile D., a painter who rendered himself famous in the early stage of the art after its restoration. He was born at Verona in 1532, and was a disciple of Giovanni da Ficole. His most conspicuous work was a picture in the great council chamber of the state of Venice, executed by order of the doge and senate, who regarded the work as so extraordinary a degree of eloquence, that they granted him a pension for life, and confirmed him the privilege of wearing the habit of a noble Venetian: the highest honour in the power of the state to bestow.

Many of his pictures adorn the pope's palace of St. Giovanni Laterano, and the churches of Florence, Urbino, Perugia, Siena, and Rome. One of them in the church of Santa Maria Nova, placed over the tomb of cardinal Adami, representing the Virgin and child, with St. Joseph and St. Benedict, was highly commended by Michael Angelo; whom Vasi report as being accustomed to say that in painting the land of Gentile was correspondent with his name. He died in 1413, 83 years old.

FABRILANO, in Geography, a town of Italy, in the marquisate of Ancona, at the foot of the Apennines, containing several rich monasteries; called one of the four首席 of Italy, and celebrated for its excellent paper; 33 miles S.W. of Ancona.

FABRIC, the structure or construction of any thing, particularly of a building.

The word is found in the Latin, fabrica, which originally signifies a man's shop, or factory.

In Italy, the word fabrica is applied to any considerable building;
building; in France it rather signifies the manner of building.

Fabric Lands, are lands given towards the maintenance, rebuilding, or repair of cathedrals or other churches, mentioned in the Act of Oblivion. 2 Car. II. cap. 8.

In ancient times almost every one gave by his will more or less to the fabric of the cathedral or parish church where he lived.

FABRICIA, in Botany, (so named by Gærtner in honour of the celebrated John Chirilian Fabre, late professor of Rural Economy in the Danish university of Kiel, a pupil of Linnaeus, from whose manuscript notes professor Gieke derived much and important assistance in his edition of Linnaeus's lectures on the Natural Orders of plants, published in Latin at Hamburg in 1792. This able man is, however, far more known as the founder of a new system in Entomology, in which he pursued the Lin- nanian idea, with respect to quadrupeds and birds, of making the organs of feeding subservient to the purposes of arrangement. But however this principle may lead to a natural system in those tribes, in insects it often fails, because in their perfect state eating is by no means their primary or necessary occupation. See Entomology. Gært. v. 1. 175. t. 35. Sm. Tr. of Linn. Soc. v. 3. 256. Wild. Sp. Pl. v. 2. 951. Càis and order, Icacinandu Monogynia. Nat. Ord. Hespriides, Linn. Myrti. Jaff.

Gen. Ch. Cal. Perianth turbinate, half inferior, attached to the germen, with five deciduous teeth. Cor. Petals five, rounded, concave equal, fleshy, inserted into the rim of the calyx. Stam. Filaments numerous, distinct, awl-shaped, inserted into the rim of the calyx, shorter than the petals; anthers roundish, incumbent. Pf. Germain half superior, turbinate, its base attached to the calyx, style cylin- drical, short, erect; stigma capitate. Pet. Capsule orbicular, depressed, umbilicated, of eight or ten cells, opening vertically; partitions from the centre of each valve, meeting at the column. Seeds one or two in each cell, compressed with a membranous, rounded, terminal wing.


Obi. This genus is next akin to Lepsoarium, from which it differs in having numerous cells to the calypse, and very essentially in having winged seeds, which are only one or two, not many, in each cell. Both were confounded with Phylledophus by Dr. Solander, merely because he never happened to have examined the latter, and referred them to it, during his voyage, trusting to future opportunities of investigation, as in many other instances. For such apparent inaccuracies therefore the memory of this excellent man is no way responsible.

The species of Fabricia at present known are two.


FABRICIO, GERONIMO, in Biography, more commonly known by the name of Hieronymus Fabricius ab Aquapendente, was born at the town of this name, in the territory of Orvieto, in Italy, in the year 1537. His parents were but poor, yet they found the means of procuring him a good education. He was sent to Padua, where he acquired a knowledge of the Latin and Greek languages, and, after having gone through the usual course of philosophy, he began the study of anatomy and surgery under Gabriel Fallopio, one of the most intelligent professors of his time. His progress under this excellent tutor was such as to render for him a character not less distinguished than that of his master, whom he afterwards succeeded in the professor's chair, in which he taught the fame sciences for nearly half a century, in the university of Padua. During the whole of this long period he maintained a uniform character for eloquence and erudition, and continued to excel in the study of his profession. He died universally regretted in 1619, at the age of 82 years.

The kindnes and disinterested generosity of Fabricio gained him the esteem of the principal families of Padua. The republic of Venice conferred many marks of their attention on him: they built a spacious anatomical amphitheatre, on the front of which his name was inscribed; and decreed him an annual stipend of a thousand crowns, and the honour of a statue, and created him a knight of St. Mark. The celebrity which he obtained for the university of Padua by his talents, afforded him a gratification above that which accrued from all those flattering favours.

His attention was chiefly directed to anatomy and surgery, both of which his researches materially contributed to elucidate. He is said to have been the first to notice the valves of the veins, having demonstrated their structure in the year 1574. The honour of this discovery has also been given to Paul Sarpi; but Albinus and Morgagni are of opinion that he was anticipated by Fabricio. They are not incorrect, however, in assigning the use of this valvular apparatus; but Fabricio has given excellent views of its structure in his engravings. He was exceedingly methodical in his writings, first describing the structure of each part of the body, and then its uses. Valuable as his anatomical writings were, however, his surgical works obtained for him a still higher reputation. The improvements which he introduced into the practice of his art, in consequence of his accurate anatomical knowledge, and the confident form which he gave to it, have, in fact, gained him the appellation of the father of modern surgery. His works are numerous: the first, intitled "Pentateuchus Chirurgieus," published at France, in 1592, contains five dissertations on tumours, wounds, ulcers, tractions, and luxations. 2. "De Vino, Voce, et Auditu," Venice, 1600. 3. "Tractatus de Oculo, vides Organo," Pad-ua, 1604. 4. "De Venarum Obitio," ibid. 1625. 5. "De Locutione, et eius Infrumentis," ibid. 1628. It is in fact that, in one day, all the Germans deferred the school of Fabricio, because, in explaining the mechanism of the muscles of speech, he had ridiculed their mode of pronunciation. 6. "Opera Anatomica, que continetur de formato Facie, de formatione Ovi et Pulli, de Locutione et eiusmod Infrumentis, de Brutorum locis," Padua, 1624. The efficacy on the language of brute animals, in this work, is curious, and worthy the attention of naturalists. 7. "De Musculi Artificio, et Officium Articulationibus," Vicentia, 1651. 8. "De Repiracione et eius Infrumentis, libro duo," Padua, 1615. 9. "De Motu locali Animalium secundum totum," Padua, 1618. 10. "De Gula, Vegetriculo, et Latis, Tractionibus," ibid. 1618. 11. "De Integumentorum Corporis," ibid. 1618. 12. "Opera Chirurgica in duas Partes divisa," ibid. 1617. This work, in which all the diseases of the body, which are curable by manual operation,
tation, are treated, paffed through seventeen editions, in different languages. 13. "Opera omnia Phvsiologica et Anatomia," Leipfice, 1687. 14. The whole of his works were also published at Leyden, in 1723, and in 1737, in folio. We have mentioned only the original editions of the works of Fabricius ab Aquapendente, most of which have been several times reprinted.

FABRICIUS, CATUS, a Roman commander, distinguffhed for valour and great integrity, was conful the first time B. C. 282, when he gained a complete victory over the enemies of his country, and gained so large booty, that after liberally rewarding his soldiers he brought four hundred talents to the public treasury on the day he triumphed, and this glory was all the recompence he reffered for himself. He is particularly distinguffhed for his conduct as ambaffador to Pyrrhus, king of Epirus, who attempted to gain him over to his cause by magnificent preffents. Thfe the general re- jected with indignation and contempt, which excited the for- prise of the monarch, who was afflicted to fuppofe every man vefal that approached a court. He was, however, more afloumed at the virtue of Fabricius, who, when his opponent in the field, refused the offer of the royal physician to poifon his master, and caufed the treachery to be made known to the king. Fabricius, in the year 275, ferved the office of cenfus, and difplayed that rigour againft luxury which had been culpable among the ancient Romans. What he enjoined by precept and the authority of his office, he gave weight to by his own example. He condemned riches during the whole of his life, and died so poor that a dowry was given to his daughters out of the public treasury. Out of pure reffpect to his memory, a law of the 12 Tables was diffenfioned with, which prohibited burials within the city. To simplicity of manners he added contemptufl skill as a general, and an exftensive knowledge of whatever related to public affairs. Univer. Hift. Plutarch.

FABRICIUS, GEORGE, was born at Kemnitz, in Mif- nia, in 1516, and entitled to notice in this work on account of his poetical talents. He published twenty-five books of facred poems, printed at Bafli in two vols. 8vo. 1567. He wrote "The art of poetry in seven books;" "A defcription of Rome and Travels," in plain profe: likewise "Rerum Germaniae magne et Saxonicarum urbis memoria- bilia," 2 vols. fol. Saxonicarum feu Origines Saxonicae, 2 vols. fol. and "Rerum Missierum," fol. He published a collection of the Christian Latin poets, with alterations. He died in 1571, and is much extolled by his countrymen for ease and purity of style; and so nice was he in the choice of language, that in his facred poems he refused to employ a term which referred to Pagan mythology. Morevi.

FABRiciUS, JOHN ALBERT, who is celebrated for his great erudition, was born at Leipfice in 1668, and left a helpful's orphan at a very early age. His education was not neglected, and having borrowed of his school-mater the Adverfaria of Caffar Barthens, he was so afloumed at the learning displayed in that work, that he determined, though at that time only 16 years old, to rival the author in his erudition. On his return to Leipfice, in 1686, he entered vigorously upon the study of theology, and began to conceive the project of his great work, and made collections for the purpofe. His firft publication was entitled "Miscel- lanceous remarks on the feventy Interpreters of the Old Testament." During the next feveral fuccefive years he distingufhcd himself as a preacher, a writer, and an able difputant in theology. In 1693 he went to Hamburg, and undertook the superintendance of the Library of John Frederick Mayer, devoting all his leisure to literary purpofes. In 1697 he published the firft edition of the "Biblifheca Latina," in a single volume 8vo. In 1699 Fabricius was elected to the vacant chair of eloquence at Hamburg, and soon afterwards took the degree of doctor of theology, and married the daughter of a school-mater at Hamburg, whom he eventually succeeded, and notwithstanding the extent of his private studies, no man was more affidious in the instruc- tion of his pupils, to whom he devoted ten hours a day for many of the first years in which he was engaged in that occupation. He died in the year 1736 in his 68th year, leaving behind him works that must perpetuate his name for long as learning is in efteeem. Of thefe the principal are:—"Biblifheca Graeca," in 14 vols. 4to. 2. "Biblifheca Latina," in two vols. 4to. The former is an extensive and accurate account of the works and lives of Greek authors, with extracts from their most rare and curious books: the latter is a fimilar work with regard to Latin writers. 3. "Biblifheca Latina Eccleflialica," or a collection of Latin writers concerning eccleflia- fical afairs. 4. "Codex Apocryphus Novi Testamenti," 3 vols. This is a curious compilation of all the fake gospels, &c. current in the early ages of Chriftianity. 5. "Biblif- graphia Antiquaria," in two vols. containing a notice of all the Hebrew, Greek, Roman, and eccleflialic antiquities. Fabricius was a very modish man, and mild in his difpofition, and it is thought that he was scarcely ever furpafted in a knowledge of books, fo that he obtained the title of Bibli- ficarius Republica literaria." Morevi.

There is no his torian, biographer, or artifft, who has been in search of Greek and Roman literature and science but had great obligations to the indefatigable labours, learning, accuracy, and good taste of this most excellent writer, who is one of the few that can never have been confulted unpro- fitably. So ample is the information he affords on every subject which he treats, that the enquirer is not only free to find what he looks for, but full more free of its authenticity and exactitude, when found.

FABRICIUS, WILLIAM, better known by his surname HILDANUS, was born at Hilden, a village of Switzerland, where he was born. He published in the 25th of July, 1560. Like his predecessor of the fame name, Fabricius of Aquapendente, he became one of the most eminent in geons of his age, and contributed not a little to the improvement of the art. He repaired to Laufeann in the year 1566, where he completed himself in the art of hagiography, under the tuition of Giff- fon, an intelligent teacher in that city. Here he pursued his researches with indefatigable industry, and undertook the care of many difficult cases, in which he was likewise successful. He combined a knowledge of medicine with that of his own art, and began to practice both at Payerne in 1605, where he remained ten years, and in 1619 settled himself at Berne, in confequenfe of an invitation from the senate, who granted him a pension. Here he enjoyed the universal efeem of the inhabitants. But in the latter period of his life he was prevented by severe and fre- quent attacks of the gout from rendering his services to his fellow-citizens with his accustomed affidity. At length, however, this malady left him, and he was feized with an affhahn, of which he died on the 14th of February, 1634, at the age of seventy-four. His works were written in the German language, but most of them have been tran- lated into the Latin. He published five "Centuries of Observations," which were collected after his death, and printed at Lyons in 1641, and at Strabourgh in 1713 and 1716. These "Observations" present a confiderable number of curious facts, as well as defcriptions of a great number of instruments of his invention. His collected treatifes were published in Latin, at Frankfort, in 1646, and again in 1684.

FABRICIUS, James, an eminent physician, was born at Rolstoek on the 28th of August, 1577. Following the advice of Hippocrates, he joined the study of the mathematics with that of medicine, and was a pupil of Tycho Brahe. His medical studies were not confined to his own country; for he travelled through England, Germany, and the Low Countries, in order to obtain the instructions of the most celebrated professors; and afterwards repaired to Jean, where he was distinguished by the extent of his acquirements, and obtained the degree of doctor at the age of 26. He soon gained extensive employment in his profession, and at length received several lucrative and honourable appointments. He filled the situation of professor of medicine and of the mathematics at Rolstoek during forty years, was first physician to the duke of Mecklenburgh, and afterwards retired to Copenhagen, where he was appointed chief physician to the kings of Norway and Denmark, Christian IV. and Frederick III. He died at Copenhagen on the 16th of August, 1652, in the seventy-fifth year of his age; and his remains were carried to Rolstoek for interment, by his sons-in-law and daughters.  


FABRICIUS, Philip Conrad, professor of medicine in the university of Heuslaid, was the author of several useful works on the subjects of anatomy and surgery, which have obtained for him the praise of the judicious Haller. His first treatise was entitled "Ideo Anatomies Practice," Wetzlarie, 1744, and contained some new directions respecting the art of injection, a description of several branches of the portio dura of the seventh pair of nerves, &c. 2. "Sciagraphia Historia Physico-Medica," Wetzlarie, 1746, in which are some good observations relative to the abuse of the operation of trepanning. 3. "De Cognitionis Anatomofos Vomorum insigni Us," Heuslaidi, 1730. 4. "Observationes omnium Anatomicæ," 1754. 5. "Syllogis Observationum Anatomiaecum," 1759. Haller. Bibl.  

FABRICIUS, John Lewis, a learned Swis divins, was born at Schaffhausen in the year 1639. Great care was taken of his education, and he obtained the usual degrees. In 1656 he was admitted to the exercise of the ministry, and created professor extraordinary of the Greek language at Heidelberg. In these characters, and as tutor to the baron de Rothenchild, and to the electoral prince, he displayed so much integrity and wisdom, that he was, in 1664, nominated to the honour of ecclesiastical counsellor to the elector, who made use of his great talents in a political embassy to Schaffhausen. He was afterwards employed in Switzerland by William III. king of England, and the States General, to afflft the English savoy to the cantons, and to watch over the interests of the Dutch republic. He was likewise successfully engaged in other diplomatic business, and happily completed the work which he undertook he returned to Heidelberg, and from thence he went to Frankfurt, where he died in the year 1697. He acquired much reputation for political talents; and for theological learning; but he was desirous of that Chritiane charity which his religion should have taught him, and was active in the performance of the Unitarians who were driven out of Poland, because they refused to renounce their principles. His works are numerous, and written in the Latin language; they are entitled, "De Visu Dei, et etque fint Limitis Visu Hominem;" "De Ludis Scenicis;" "De Controversie circa Perfonam Christi;" &c. Morei.  

FABRISTAN, in Geography, a town of Peria, in the province of Mazanderan; 50 miles E. of Cailbin.  

FABRISTAN, in Geography, a town of Perfia, in the province of Mazanderan; 50 miles E. of Cailbin.  

FABRIS, in Ancient Geography, an island of Greece, opposite to Attica.  

FABRIS, in Geography, a town of Peria, in the province of Mazanderan; 50 miles E. of Cailbin.  

FABROT, Charles Amnius, in Biography, a learned jurist, was born at Aix, in Provence, in the year 1581, and after a liberal education he took the degree of doctor of laws in 1606, and was admitted an advocate in the parliament of Provence. He was afterwards elected professor of law at Aix, and from thence he went to Paris, where he printed his notes on the Greek paraphrase of Jullianus's Institutes. This work obtained for him the patronage of the chancellor Seguier, with a pension. He remained in the metropolis for the purpose of translating the Balfics or collection of Roman laws in use in the eastern empire, which he finished in seven vol. folio, with the title of Babylon. He edited other learned works, which he enriched with valuable notes. His application was almost incessant, and is said to have shortened his days, though he did not die till he had attained his 78th year. Morei.  

FABULUS, in Mythology, the god of speech, was the tutelary deity of children, and invoked by them, when they began to speak.  

FABULOUS, denotes something that has a relation to fable. Varro divides the duration of the world into two
Fabulous Philosophy of the Greeks was introduced among them by the first founders of their states. Having observed, in countries already settled, the effect of that mode of delivering the doctrines of religion to the people under the disguise of fable, which universally prevailed in Egypt, and which was not known to the Phenicians, Thracians, and other barbarous nations, they found it particularly suitable to their design of bringing states newly-formed under the yoke of authority. “It was not possible,” says Strabo, (i. 1.) “to lead a profane multitude to religion and virtue by philosophical harangues; this could only be effected by the aid of superstitition, by prodigies and fables. The thunderbolt, the eagle, the trident, the spear, torches and vases, were the instruments made use of by the founders of states to terrify the ignorant vulgar into subjection.” Indeed, it cannot be doubted, that the first authors of the Grecian fables intended them to be vehicles of instruction. But it is now become almost impracticable to decipher their meaning; because we are imperfectly acquainted with the history, opinions, manners, and other circumstances of the times, when Grecian mythology was formed, and from what a variety of sources it was derived. Of these the two principal were, the custom of ranking public benefactors, after their death, among the gods (Phil. Hilt. Nat. ii. c. 17.) and the practice of applying allegories and fables to natural objects and appearances. (Dion. Halic. Antiq. i. i.) The origin of the world, and the production of natural bodies, were very early clothed in fable, in the cosmogonies of the Egyptians, Phenicians, Thracians, and other nations; and these were afterwards imitated by the Greeks. (See Cosmogony.) Another custom, which has very much contributed to cast a veil of obscurity over the fabulous philosophy of the Greeks, is that which prevailed among them in early times, of giving their mythological doctrines a poetical dress. These were commonly chosen as subjects of verse, and every poet enlarged and moulded the ancient fables, according to the fertility and luxuriance of his own fancy. See the articles Prometheus, Linus, Orpheus, Musæus, Amphion, Melampus, Hesiod, Epenides, and Homer. See also Chaos and Theogony.

Faburden, in Music, is an old English term, and used at the beginning of difficult, to express what has since been styled counterpoint. If this species of harmony had its admirers, it had likewise its enemies, when it was introduced independent of the Gregorian chant, or when this chant was corrupted by it; and if many lutes remain for celebrating feelligals “cum cantu, et difficilis, a haute voix, a chant et a decant,” there are others to confine the art, and keep it within certain bounds. It was thought so licentious at the beginning of the fourteenth century, that the use of it was prohibited in the mafs by a bull of pope John XXII. 1322. However, there is at the end of it this favourable clause: “It is not our intention wholly to prevent the use of concords in the sacred service, particularly on great feelligals, provided the ecclesiastical chant or plain-song be carefully preferred.” The Abbé Lebœuf observes, that those who drew up this bull, which is inserted in the body of canon laws, erroneously confined difficulty to fourths, fifths, and octaves, from the perusal of ancient authors on the subject of music, particularly Cassiodorus, where they had found the following definition: “Symphonia est temperamentum fonsis gravis ad acutum, vel acutum ad graven, modulam efficiens, live in voce, live in persecutione, live in flatus. Symphonicus est lex: prima, disteberron: secundus, dispanso: tertius, dispanso et disteberron: quartus, dispanso et dispanso et disteberron: quintus, dispanso et dispanso et dispanso et disteberron. The reason or music in consonance, is the mixing of graces founds, acute, or acute with grave, either in fuging or playing upon affraged or wind instruments. Symphonic concords are fixed; the fourth, fifth, and eighth, with their octaves.” It is hardly possible to read this passage, and not give up the contest concerning ancient counterpoint; or, at least, reduce it to that meager kind, of which an example has been given in the first volume. (Hist. Music by Barney, p. 145.) It is easy to suppose, says the Abbé Lebœuf, that the design of those who first permitted chants in faburden to be sung in the churches of France, was to distinguish festivals and holy times, by the ornaments and graces with which they were sung; as, in others was done by allowing particular portions of the service to be performed in fardour, or counterpoint. Traite Historique fur le Chant Eccles. See False-Bordone.

FAC, in Italian Music, is an abbreviation of facciata, a facade, or page. See Carta.

Facade, in Architecture. See Face.

Facade, or Mural Aspect, in Geology, is a term for the precipitous face of a rock; these, in some few instances, are occasionsd by the strata below having sunk down at a fissure or fault, in others, on the sea shore, they are occasioned by the waves having undermined and let down the strata, and successively washed away the same; but more commonly facades are occasioned either by the violent excavation which varies have undergone, or by the abruption of the strata in certain districts, as Dr. W. Richardson calls it (Phil. Trans. 1808), but which had previously been called in our work abulation, which fee. According to the observations of Mr. Farcy, nearly all the lime-stone facets in the Derbyshire mountains appear to have been the skirts of veins, and their being coated with the spars peculiar to vein-skirts, seems to have preferred them from mouldering down or decay, in most instances.

Facata, or Faccata, in Geography, a sea-port of Japan, in the island of Ximo, where the Jefuits had formerly a considerable estabishment, and a church; 27 miles W. N. W. of Taibero.

Facaute, a town of Alfaci Turkey, in Caramania; 63 miles N. N. W. of Cogni.

Face, the surface or first side which a body presents to the eye. See Surface.

Face, in Anatomy, denotes the same part of the body as the same term signifies in common language. Our arrangement of the anatomical department of this work has rendered it necessary to describe the various parts of the face in different articles. The mouth, lips, and cheeks are described in the article DeUglution; the eye-brow, eye-lids, and eyes in the article Eye; and the nose in the article Nose.

Face is particularly used for the visage of an animal, and especially of a man, as being in him the only part of the body that ordinarily appears to the eye. The Latins call it facies, vultus, os, &c.

The great variety observable in men's faces, voices, and hand-writings, furnishes a noble argument of a Providence.

The human face is called the image of the soul, and being the seat of the principal organs of sense; and the place where the ideas, motions, &c. of the soul are chiefly set to view. Pride and disdain are shewn in the eye-brows, modestly on the cheeks, majestically on the forehead, &c. It is the face which shews the Iex, age, temperament, health, or disease, &c.
The face, considered as the index of the passions, habits, &c. of the person, makes the subject of physiognomy.

**FACE.**

**Face, or Façade, in Architecture,** is sometimes used for the front of a building, or the side on which the chief entrance is; as also for the side it presents to a street, garden, court, &c. and sometimes for any side opposite to the eye.

**Face, Facia, or Fafcia,** also denotes a flat member having a considerable breadth, and but a small projection. Such are the bands of an architrave, larnier, &c. See **Fascia.**

**Face of a Stone,** is the surface or plain part which is to lie in the front of the work. The face is easily known when the flone is sculpted, as being always opposite to the back, and the back going rough as it comes from the quarry.

The workmen generally choose to make one of those sides the face which, when in the quarry, lie perpendicular to the horizon, and consequently the breaking, and not the cleaving way of the stone.

**Face of a Gun, in the Artillery,** the surface of the metal at the extremity of the muzzle of a piece.

**Face, in Astrology,** is used for the third part of a sign. Each sign is supposed to be divided into three faces: the ten first degrees compose the first face, the ten following ones the second; and the last ten the third. Venus is in the third face of Taurus; that is, in the last ten degrees thereof.

**Face of a Plant.** See **Habit.**

**Face of a Balloon, in Fortification.** See **Face,** in a Military Sense, and **Bastion.**

**Face of a Place,** denotes the interval between the points of two neighbouring balions, containing the curtain, the two flanks, and the two faces of the balions that look towards one another.

This is otherwise called the **tenaille** of the place.

**Face Proximis,** is that part of a line of defence raffant, which is between the angle of the epaule or shoulder of a balion and the curtain; or the line of a defence raffant diminished by the face of the balion.

**Face, External, Facies externa,** in Ichthology, is used to express a general form or figure in certain fishes, by means of which they agree with some and disagree with others; and according to which likenesses or dissimilarities some authors of the latter ages have arranged them into genera. This general figure in fishes confin’d in the shape of the head and body, and the shape, size, and proportion of the fins and tail, and though very obvious, is very indistinct; it being in many cases, where two fishes have the same general external face, yet hard to lay, on a close examination, in what it is that the likenesses confin’d. The authors who founded the division of the genera of fishes on these external resembiances ran into very great errors; for it is not enough in a general division for the character to be obvious, but it must also be precise and determinate. What this faces had in the first of these requisites is often wanted in the last; and, in general, it has been found to be no true basis of division.

Many fishes have the faces externa, or general appearance so much alike, as to be easily confused at sight into the same genus; and that jujtly, as they really belong to the same when more precisely referred to it, according to their natural and more essential characters. Of this kind are the gadi, the elopex, the falmons, the petromyzon, the coregones, the pleuronectes, the rays, and many of the cyprini. In these fishes externa is of real use, as it is an obvious mark, and leads to the road of truth; but there are besides these many other fishes which, though they are truly of the same genus, yet differ extremely in their several external appearances, so that any method founded on the faces externa must separate them, though nature had really joined them in their real characters. The tenu and the thuta lacunarios, or lake-trout, are in regard to their faces externa extremely alike one to the other, yet here this obvious character deceives us; for the tenue is a species of the cyprini, and the other a true and genuine salmon, two genera of fishes essentially and very widely different, though this method of judging by the external appearance would have coupled together fish belonging to them both. In the same manner the secrupena and cotonis are very like one to the other in their external appearance; but when wisely examined, according to the rules of ichthology, they are found to belong to two very different genera, and to have very little real likenesses. From these, and numerous other examples of a like kind, it evidently appears, that as the faces externa cannot be depended on for establishing the genera of fishes, some more essential characters must be conjoined after for the regular and natural completion of this necessary business. Therefore, the general characters of fishes are to be sought after in their external and invariable parts, and they are to be arranged into families and genera, according to the agreement of these in number, situation, figure, and proportion. Among all these, the characters taken from the number of the parts, where that is certain and invariable, are most valuable, as they most readily offer themselves to the eye, and are least of all liable to error.

**Face, in the Manege.** See **Chafnery.**

**Face, in a Military Sense,** means that front which is shown by a body of troops, or the general bearings of any particular defenses in a fortified place: as the former influence, reference is had to the line of front, and not to any change of individual position, whether by turning (i.e. facing) to the right or to the left, for the purpose of marching by files; nor does an echelon movement in any wise alter the meaning; it being even understood that the line of pivots, on which the wheel was made, denotes the true front or face of that part of a line; though to an enemy there will be presented an equivocal definition, or display, in consequence of the tendency of an echelon movement to produce a rapid change of front. For a further insight into this part of our subject, we refer our readers to **Escullion and Evolution.**

The face of any lines, or fortified works, is to be ascertained by a consideration of what proportion of any real figure, or of any imaginary one, the several defences may occupy. Thus, in a square, there will be four distinct faces; in a pentagon, (or figure of five sides,) there will be five; in a hexagon, (or figure of six sides,) there will be six; and thus of any number of portions into which a circle, an ellipse, (or oval,) or any other perimeter, or circumference, may be divided. In all these we judge by the chords, subdividing the several portions respectively, without adverting to their being either equal or similar, as they should properly be in all works coming under the designation of "regular fortification," of which an ample description has been given under the head of **Construction, Military.** It may be proper in this place to observe, that our best engineers make it a rule not to extend a face beyond certain limits, proportioning the width of the curtain to the magnitude of the area to be enclosed. Consequently, large areas, which give a greater circumference, are necessarily defended by more faces than those of smaller compass, whereby the flanked angles of the balions become
some more obtuse, it being evident, that the angles of a triangle inscribed in a circle will be more acute than those of a square, (under similar circumstances,) those of a square, more acute than those of a pentagon, and thus, ad infinitum.

The first system of Monsieur Vauban is that generally adopted upon: it divides fortification into three classes, namely, the little, the mean, and the great. The exterior side of the little gives from 120 to 175 toises (or fathom); that of the mean includes from 175 to 185 toises; and that of the great ranges from 185 to 260 toises. Hence, we readily estimate the number of faces into which the circumference of an area should be divided, observing, that whenever any portion of that circumference imposes on us a long side, that is, above 280, but not exceeding 340 toises, there must be formed two faces, covering such long front, or face. This is done by adopting each extremity of the latter as a centre, and describing from them respectively an arc, having 180 toises for the radius: the intersection of those arcs opposite the centre of the front will be the point of union of two faces, of which the ends of the front, whence the arcs were drawn, will be the other extremities.

If the front should exceed 360 toises, it should be divided into as many portions, from 175 to 185 toises each, as the ground may permit; each such portion being considered a separate face, and to be defended by flat bastions. It has, however, been always considered expedient to protect all such disproportioned faces, by means of whatever outworks may be most applicable to local circumstances. Thus, if there be three such conjunct faces, the centre one should be covered by a horn-work, of which the flanks ought to be thrown at such an angle as might not admit of their acting in behalf of the besiegers, should they succeed in wrestling them from the garrison. If only two conjunct faces are to be defended, the central bastion should be well covered by exterior defences; such as a counter-guard, well flanked by lunettes, tenaille, a fleche, &c.; so as to give full effect to the defences, but without subjecting them to become obnoxious thereto, when polled by the enemy.

The faces of any particular work, such as a raveline, or a bastion, are those parts which form an angle projecting outwards from the place, towards the enemy, or country: consequently, the faces of works that are mutually parallel, must have the same line of fire, or aspect; and, in the same degree, flank all other works standing at an angle of least not less than 60° nor more than 120°.

Face of the Measures, in Mining, is that part of a mine bounded by the length-way or principal vertical joints, or natural cracks of the measures. In coal mines, these principal joints are called prime back, or face joints, and are generally parallel to each other; and, according to the recent observations of Mr. Fary in Derbyshire and Nottinghamshire, thence seems to tend towards the same point of the compass, without regard to the direction in which the measures may dip or incline; so that the face of the work in the collieries there, is generally towards the two o'clock sun, or its opposite direction, which seems a curious circumstance, and may prove of importance, if more extended observations should shew it to be a general fact: the inferior joints which cross the flines, almost at right angles, are called end-joints, or cutters, which fee.

Face, Fr. in Maffe, is used to distinguish the different forms of the triad, or ways of taking the common chord; as 1st face 1, 2nd face 2, and 3rd face 3; or, as we should say, first face or station of a chord, &c. A chord has as many faces or forms as it has notes. The chord of the 7th to G, for instance, may be played four several ways on a keyboard instrument, placing the thumb on the lowest note, as 7, 5, 3, 1.

Face, the Human, to the painter and sculptor is an object of the utmost importance among their various studies. In endeavouring to convey in their representations of the human figure the influence of those motions of the mind which arise from the subject adopted, and which are supposed to occupy the bosoms of the persons represented, much is done by the general action of the figure; but it is the expression or action of the features of the face which identifies the passion, conveys the full idea of its influence, and literally "gives to airy nothing a local habitation and a name." A regard of the eye, a motion of the lip, or of the nostril, sometimes speaks a language more forcible than words. An intimate acquaintance therefore with the structure of those silent monitors, the features of the face, with the bulk proportions either for their expression or beauty, appears to be absolutely necessary to obtain excellence in the art of representing the different expressions caused by their variations.

It will be necessary, in order to treat this subject fully, to trace the growth of the human face from its stage of childhood to its maturity and decline, each stage having its peculiar variations, and the knowledge of each being requisite for the exhibition of the painter's and sculptor's art.

That kind of character which marks the years of childhood is so clearly discernible, that it admits of no dispute. The form of the faces and features of children is as peculiar to themselves as the simplicity of their minds; yet we frequently observe, even in very young ones, certain indications of genius or fluidity, which ripening time afterwards justifies. The form of the faces of children inclines to the circle, in contradistinction to that of the adult, which is oval, or rather egg-shaped, with the apex downwards. The features, when young, are also round and softened: the iris of the eye is very large in proportion to the face. Mr. Hogarth, in his "Analysis of Beauty," observes, "that it ever continues the same size, so that you may sometimes find it in a new-born babe as large as in a man six feet high;" it serves, therefore, as a standard to measure the growth of the other parts of the face. The nose is flat, the cheeks plump and round, making the mouth appear flattened in the face; the ears are large, and the whole expression heavy. During infancy the faces of boys and girls have no considerable difference, but as they grow up the features of the boy take upon themselves more marks of peculiar character, and grow fatter in proportion to the iris of the eye than those of the girl, thus shewing the distillation of sex in the face. A many featured boy therefore has his features larger than ordinary in proportion to the iris, whilst those who have the contrary look younger and more childish than they really are.

In the progress of the face to maturity the features lose much of their roundness, and partake more of the oval, the nose rises, the cheeks retire, the mouth forms, and the disposition of the mind begins to show itself in the air of the face, and more especially we now perceive a difference in the sexes, in the more speedy advance of the female towards that form which constitutes beauty.

By degrees, The human blossom blows, and every day Soft as it rolls along those former charms.

'The father's lullaby, or the mother's bloom.'
That distinguishing peculiarity, the growth of the beard, also takes place in the male; now indeed with this (the inhabitants of southern Europe) under sentence of excommunication, but once universally esteemed the proudest distinction of man, and cultivated with all imaginary care by sages and heroes. See Beard.

Arrived at maturity, the face possesses the whole character of the man, both physical and intellectual, and other features distinguished by its character of sense or beauty, or appears odious in its grossness and deformity.

But the visitations to which all the productions of this world are subject forbid a permanence of that maturity, and having now no further progress to make in advance, the beauties of the face gradually change, wither, and die. Imperceptibly at first alteration takes place in the features, they lose their softness and fullness; lines fixed upon the cheeks and forehead; the colour of the face declines, and the countenance becomes more and more marked with the repetitions of the actions and expressions of the passions. Advancing in life the change becomes more visible, and at length even rapid; and the continued action of the muscles of the face increasing the marking of its various parts, they become more angular, and broken into many forms; the projections of the bones become more apparent by the sinking in of the cheeks, from the lots of the teeth, which canes also the lips to disappear, by folding over the gums; and when the teeth are all gone, the mouth closing, brings the jaws nearer together, and shortens the space between the nose and chin; till at last time triumphant, overcomes all that distinguished the vigour and sense of man, or the beauty and amiability of woman, and renders those who bore so much resemblance to each other in infancy, again similar in intellect and in person; till the last earthly scene cloaks and mingles them in their common dust.

The varieties of the human countenance are not confined to these distinctive marks of the different periods of its existence. Every country, every climate, has its peculiarity; it would require a copious dissertation to describe all the peculiarities that are nationally characteristic; a few of the principal ones will answer our purpose. (See Plate III. Paintings, figs. 1, 2, 3, 4, and 5.) Among them none are so obvious as the difference of the negro and the white man, in colour more particularly; for as to form, though the thick lips, broad flat nose, the want of beard, and the woolly texture of the hair of the former, are powerfully distinct from the appearance of the European; they are not more so than are the features of the Tartar or the Chinese, who have round faces pointed at the chin, small eyes, with the outer angle inclining upwards, giving through the character of cunning. In the North another race of men are found likewise different in their faces as well figure. The Laplander, and his opposite in North America, the Equincaux Indian. Hidious deformity to the eyes of an European characterizes their countenances, large, fat, and broad faces; broken and thick noses; thick eye-brows drawn back towards the temples; high cheek bones; thick lips; and large mouths, confine to dignity the "human face divine," as the poet has termed it, and conceal the expression of all that is amiable or inviting.

The successive approaches to union of these countries produce also the same succession of approach in countenance. From the East, the Chinese, the Hindoo, the Persian, the Turk, the Hungarian, the German, &c.; and from the North, the Laplander, the Russian, the Pole, the German, &c. have each their distinct classes of feature gradually receding from, and approaching to, each other: and on the Southern side of Africa, the union of the features of the Negro and Chinese are found in the Hottentot (Barrow's Inland Tom from the Cape of Good Hope.) Add to these the different features of the various tribes of North and South America, and some idea may be formed of the almost infinite varieties of the human face. To such a wonderful extent is this carried, that it is probable that from the first formation of man to the present time, no two human beings have been exactly similar in feature and form of face.

This speculation, however, is carrying the matter much farther than is absolutely necessary for the purpose of the historical painter. Though it is not amiss to be thus informed on this head, yet as it has been said, and justly too, "that his principal business is to paint man, not men; the generic character, not the individual species," we will point out those proportions of the face which are allowed to be the most effective in exhibiting beauty or manly character. For this we must turn our eyes to the Greeks, who appear to have systematically arranged their ideas and practice in the production of their statues.

Audran, in a work published in Paris, has given the following comparative scale of proportions of the faces of the Apollo Belvidere, and of an antique Venus, from actual measurement. Taking the length of the nose, which he calls a part, and dividing that in twelve parts, which he calls minutes, he states the faces of the Apollo and of the Venus to have each three parts from the growth of the hair on the forehead to the bottom of the chin. Dividing the lower part into three, the uppermost gives the line of division of the lips; the other parts are proportioned as follow:

<table>
<thead>
<tr>
<th>Apollo</th>
<th>Venus</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Width of the face from ear to ear</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>The eye, seen in front</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Space between the eyes</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Eye in profile, and the pupil in width</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Width across the nostrils</strong></td>
<td>7</td>
</tr>
<tr>
<td><strong>Nose in profile</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Width of mouth in front</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>From the nostril to the ear, in profile</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Length of the ear</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

See Plate I. Paintings, figs. 1, 2, 3, 4.

The greater part of the Greek statues of the higher class have nearly the same proportions, and in sculpture these rules are most usually adhered to, particularly where the subject is either a personification of divine or heroic character, which are indeed the only proper subjects for the display of this art. But painting having a wider range, both in subject and action, cannot always be bound by them, and in many views of the face it would be absolutely impossible to apply them. As the practice of the painter calls for more individuality than that of the sculptor, so is he more or less at liberty to dispense with these proportions in a degree; and it must never be forgotten that men of different characters have differing countenances, their peculiar expressions requiring, or rather, perhaps, producing, different proportions. The painter who makes all his faces of the same standard can never excite an interest in his works, and ever enjoy the praise of selecting with judgment, or feeling the productions of nature for his imitation. This diversity in the form of the faces and features arising from internal character is the basis of physiognomy, to which, for farther illustration upon this subject, we refer the reader.

The general proportions mentioned above are, nevertheless, of essential service to the painter; for if they cannot be
be said to have a binding influence over him to cause him to adhere to them alone, they serve him excellently as a rule to swerve from, constantly checking his caprice, and preventing his running into too common-place an imitation of nature, and producing caricature, instead of that character, confident with the dignity of style, which should accompany all grand works aiming at superiority of effect.

In drawing the face there are some regulations which facilitate the progress of it. Having made the oval, or general shape of the head, it is usual to draw a perpendicular line down the centre when seen in front, and that is crossed by a horizontal one in the middle, for the station of the eyes. The perpendicular line being divided into four equal parts, the three lower ones give the space for the face, and according to the above-mentioned rules all the various parts may be set off upon these lines, it being remembered, that the eyes, nose, and mouth, are always parallel, and the bottom of the ears on a level with that of the nose; and in whatever view the face may be required to be drawn, these lines, though varying in their directions, will still be of use in determining the positions of the features. In a head looking downwards there which were horizontal in a direct front view, will be found to become concave, or the inferior part of a circle, and the reverse takes place in one looking upwards; and the impossibility of the painter applying in every case the rules of proportion will be clearly seen, when it is known, that in most views of the face some of the features are seen fore-shortened, (See Foreshortening) and of course others appear larger in line than their natural face.

When a face is directed to the ground, the forehead and the nose will appear far too large for the cheeks and chin; and by their projection hide somewhat of the other parts of the face. That of the forehead and eye-brows conceals part of the eyes; the nose hides the mouth partially, or totally, according to the degree of depression of the face, or elevation of the view; the mouth, if not itself rendered invisible, hides a part of the chin; and on the contrary, in the elevation of the face, the upper lip hides the space between it and the nose; the base of the nose conceals its length, and the eye-brows in part conceal the forehead as we see them under, consequent they project before it in the view.

In all these cases, as has been already observed, it is impossible to apply the rule, but the artist will do well always to keep it in view, as it will facilitate his labour, and generalize his characters, without confusing him too totally, or preventing his research after the more grand and just impressions of physiognomical character, or accidental effects of passion or expression; which give the highest value to works of art.

For the variations that take place in the face of a man whose mind is under the influence of the stronger passions, see Expression, in Painting, and Physiognomy for the variations of the lines and features indicative of the peculiarities of natural character in mankind.

Of those peculiarities in the characters of countenance, found among the higher clafs of the Greek statues, we have spoken under the word Beauty, as relative to the arts of design; of their oval shape in front; of the straight, or nearly straight line in profile formed by the forehead and nose; of this full lips, and round chin. These are the forms which were followed by those elegantly minded and wise men, the Greek artists, as most implicative of grandeur and of beauty in the human face, and the propriety of this selection still remains unimpeached, though it is very rarely app

proached by Nature, and perhaps has never been completely produced by her in one countenance; yet as these various features were found separately in her works, and viewed with gratification, the artists, judiciously united them; thus outlining in perfection the model they imitated, and producing another more pure for her imitation, which has never yet been found to equal; so that to be as beautiful as the Venus in the language of the poets, is to possess that quality in a super-human degree.

In the productions of nature the human face varies in every direction from this definitely beautiful form. In our own nation (where countenances are not in general lacking either in sense or beauty, and often possessing both to a very considerable degree,) we find among them some faces tending to the round, others to the longer proportion, some are flat, others prominent, some square, others indefinitely slenfed; the features in some are large in proportion to the face; in others, small and close together, occupying only the centre of the face, or else, far apart, and with large spaces between them. (See Plate II. Printing, figs. 1, 2, 3, 4.) These, with other variations of the like kind, are highly necessary to be observed by the portrait painter, and the sculptor, to produce individual resemblance; and endeavouring to form in the mind a clear idea of the peculiar clafs of arrangement of features in the face before them, is the readiest and safest way of producing its like on the canvas or marble. See Portrait Painting.

FACELLI, in Geography, a town of Naples, in La
don; 18 miles N.E. of Capua.

FACET, or FACETTE, a little face or side of a body, cut into a great number of angles.

Multiplying glases are cut in facets, or facet-wise. Diamonds are also cut in facets or tables.

In brilliants there are two forts, flow, or skill-facets, and star-facets. Skill-facets are divided into upper and under. Upper skill-facets are wrought on the lower part of the heel, and terminate in the girdle.

Under skill-facets are wrought on the pavilions, and terminate in the girdle.

Star-facets are wrought on the upper part of the bezil, and terminate in the table. Jeffries on Diamonds. See Diamonds.

Facets of a hill, in Geology, or face of a hill, are those parts which present a plane or flat surface. It has often been remarked, that hills and mountains have generally one flat side, and which, in most cases, faces towards the cell; and a careful examination convinces us that the fame is occasioned by this plane being the uppermost stratum of matter of which the hill is composed. In examining the geology of a district, it is of the utmost consequence to attend to the facets of the hills, because they invariably point out the position of the strata, and shew us where to look for the uniform top of the strata, and where to expect to see the edges and alternation of different strata exposed to view, wherever the vegetable soil and alluvial deposit are removed. Some few hills and mountains are composed of volcanic matters, successively and piggly evenly distributed on their surfaces, but the number of such hills is exceeding small; other hills owe their origin, in a few instances, to alluvial depositions of the ruins of strata, thrown together without order, or any discoverable law; but it is far more common in alluvial countries to find stratified hills, with heaps of gravel and alluvial matter on them, generally rising higher than they were before; but some parts of the facets of the strata are generally in such cases still to be discovered.

FACETANUS LACTANT., in Zoology, the name of a...
peculiar species of lizard, called at Rome and Naples the 
tarantula.

FACIA, in Architecture. See FACIA.

FACIAL ARTERY, in Anatomy, is synonymous with the 
external maxillary. See ARTERY.

FACIAL NERVE, is the portio dura of the seventh pair. 
See NERVE.

FACIAL Veins. See VEIN.

FACIES, in Medicine, is when the no-
trels are sharp, the eyes hollow, the temples low, the tip of 
the ears contracted and cold, the forehead dry and wrinkled, 
and the complexion pale or livid.

The facies Hippocratica is chiefly observed towards the 
period of phthises and other consumptions, and is held to 
be a fugitive prognostic of death. If it appears within three 
days after the attack of an acute disease, it is deemed to indicate 
death.

FACILE HARBOUR, in Geography, a harbour of New 
Zealand, in Dusky Bay, on the west coast of Resolution 
Island, recommended by Capt. Cook to those who are failing 
forthwith. S. lat. 45° 40'. E. long. 166° 18'.

FACING, in Engineering, is the name for a small thick-
ess of the common earth, soil, or stuff of a canal, laid in 
front of the side-lining or puddle, on the sloping sides 
C F and I G, figs. 14 and 15, Plate I. of Canals. Its 
use is to hold up the puddle while the fame is working 
and chopping in the act of puddling, and afterwards to 
guard the puddle from being penetrated by the hitches and 
polesed by the bargemen. See CANAL.

Facing, in Military Language, is that part of the 
uniform of a professional man, whether commissioned, 
non-commissioned, or private, which is contrasted with the 
colour of his coat, &c. and this relates as much to the col-
lar and the cuffs, as to those parts usually called lapels, 
which fold back from the throat down to the waist. With 
the exception of one or two regiments, all our military 
corps are distinguished by facings of various colours; all 
bearing any royal decoration being of garter-blue, as are 
also the several corps of marines. For the most part, yel-
low, buff, white, grey, and light green are in use; a few 
may be seen of black, pompadore, or scarlet. Few regi-
ments wear lapels, but confine themselves to the use of 
scarfs and cuffs of the appropriate colour, to which their 
regimental standards, and the several ornamental parts of 
equipage invariably conform. It has been considered a rule, 
though not adhered to in modern times, that whenever a 
regiment loses its colours, its facings should be discom-
nuced until the corps may have regained its credit by taking 
the colours of some opposing corps. This does not relate to 
that kind of privation resulting from a surrender, whether 
in the field, or in a fortified place, but merely to the act of 
abandoning the field in such disorder as subjects the ensigns 
to that most heart-breaking misfortune, which, to the 
 honour of the British army, may be said not to be fa-
iliar to our service.

The mode now in use, of making lapels, or facings, to 
fold over to such extent as should afford comfort to the fol-
dier, cannot be too much commended: we are surprised to 
see any deviation from a practice so evidently conducive 
not only to health, but to that comfort which facilitates 
the various movements of the soldier. Considering 
the breadth and length to be peculiar subject to drage-
ment, from exposure to arduous weather, it appears to 
us a delirium, that in lieu of the many expensive, but 
frivolous parts of a soldier's equipment, some device should 
be adopted, whereby to obviate heat, and pinching cold, 
should be prevented at pleasure from parts so easily affected 
thereby; if our information be correct the total ab-
ence of facings, such as might occasionally be either buttoned 
back, or be lapped over, a deficiency to be seen in many 
influences, has been the occasion of very serious illnese, and 
of no brief obvioue lilt, among several of our expedi-
tions.

Facing, Façade, or Revetment, in Fortification, means 
that portion of masonry, or other binding, given to ram-
parts, with the view to prevent the soil of which they are 
composed from crumbling or giving way. When of ma-
sonry, the wall should be five feet thick at the top, with 
an increaee or t ubs, equal to one-sixth of its height: but-
trelies, called counter-forts, should be built within, at 
about fifteen feet apart, to strengthen the facing. In or-
der to prevent ecalades, the facing is generally made full 
twenty-seven feet high, from the bottom of the ditch to 
the cordon. When the facing is carried up as high as the 
floes of the embrazures, it is called a whole revetment; 
but when confined to the ditch only, it is termed a half-re-
vetment. These must depend on the nature of the soil, 
the facility of obtaining materials, the time that can be 
beauyed, the importance of the points, &c. Where difficul-
ties occur, as also in temporary works, the facings are 
made with turf; in which case they are said to be gazoned. 
For field-works, and especially in the conducting of siege 
foulces, which are faggets made of various materials, are 
very generally employed, and are found to answer the in-
tention. (See Fascine.)

Facing, in Ship Carpenter, denotes letting one piece into 
another with a rabbet.

FACINI, PIETRO, in Biography, a painter of history, 
born at Bologna in 1570. He began to paint when already 
grown up to manhood, at the advice of An. Caracci, who, 
feeing a whimsical design of his in charcoal, concluded he 
would be an acquisition to his school. Of this advice he 
had reason to repent, not only because Facini routed his 
jealousy by the rapidity of his progress, but because he 
aw him leave his school, become his rival in the instruction 
of youth, and even lay snares for his life. Facini had two cha-
acteristics of excellence, a vivacity in the attitudes and heads 
of his figures, that resembled the style of Tintoretto, and 
a truth of expression which made Alon bel him himself declare that 
his colours seemed to be mixed with human flesh.

Beyond this he has little to surprize; his design is weak, 
his bodies vaft and undefined, his hands and heads ill set on, 
or had he time to correct these faults, as he died young, in 
1622. At St. Franeeceo, in Bologna, is an altar-piece of 
his, the Marriage of St. Catherine, attended by the four tu-
torial fains of the city, and a number of infant angels, 
which shews the height of his powers. His children carolling, or 
at play, in the gallery Mattei, and elsewhere at Bologna, 
are equally admired; they are in the manner of Albanii, 
but with greater proportions. Fetti's Pilkington.

FACIO, UT FACIAS, and ut des, in Law. See Con-
sideration.

FACK, in a Ship. See FAK.

FACKER See, in Geography, a lake of Carinthia, 3 
miles S.E. of Villach

FACTEUR, Fr. in Mechanics, a maker; as in music, 
a flute or fiddle maker, an organ-builder. How great a de-
mand there was for flutes in Athens, may be conceived from 
a circumstance mentioned by Plutarch in his life of Ictorates. 
This orator, says he, was the son of Theodorus, a flute-
maker, who acquired wealth sufficient by his employment 
ot only to educate his children in a liberal manner, but also 
to bear one of the heaviest public burdens to which an Athe-
nian citizen was liable, that of furnishing a choir or chorus 
for
for his tribe, or ward, at festivals and religious ceremonies. Each tribe furnished their distinct chorus; which consisted of a band of vocal and instrumental performers, and dancers, who were to be hired, maintained, and dressed during the whole time of the festival: an expense considerable in itself, but much increased by emulation among the richer citizens, and the difference consequent to an inferior exhibition. The fluctuations of trade and public favour have rendered the business of boating floats far less profitable at present than it was in the time of Theodorus. But then we have had a harscheader-maker in our own country (old Kirkman) who died worth 100,000l. and who was as able to maintain a choir as Theodorus, or any dean and chapter of a cathedral.

FACTION, a cabal or party formed in a state to disturb the public peace.

The most celebrated factions were that of the Guelfs and Gibelins, who kept Italy in alarm for many ages; and with us that of the Whigs and Tories.

FACTION was originally an appellation given to the driven troops or companies of combatants in the games of the circus.

Of these there were four, viz. the green faction, the blue faction, the red faction, and the white faction. The emperor Domitian is said to have added two others, viz. the purple and the yellow faction. These facts, with their liveries and badges, were at length abolished by the emolument which was at first between them growing to such a height, that in Justinian's time 40,000 men were killed in a combat between the green and blue factions.

FACTITIOUS, signifies any thing made by art, in opposition to what is the produce of nature.

FACTO, Dr. See the article De Facto.

FACTOR, in Agriculture, is a term which in some places, especially in the northern parts of the kingdom, signifies an agent or person who has the looking and management of an estate for another. Persons of this description are something more than bailiffs, and have commonly a knowledge of the law, in so far as landed property is concerned.

FACTOR, in Commerce, an agent or person who acts and negociates for a merchant by commission; called also commissioner, and on some occasion broker, and throughout the Levant, factor.

Factors are either charged with the buying or the selling of goods, or with both.

These, for the most part, are usually fixed in places of considerable manufactories, or cities of great trade. Their office is to buy up commodities for merchants residing elsewhere; to take them packed, and send them to the persons for whom they were bought.

Factors of Sale are usually established in places where there is a great vent. To these, merchants and manufacturers send their goods to be sold for them according to the price and other conditions expressed in the orders delivered to them; and they are authorized by a letter of attorney, with a salary or allowance for their care.

The wages or allowances for selling are usually clear of all expenses of carriage, exchange, remittances, &c. excepting the payment of letters, which are never put to account.

Factors should strictly observe the orders of their principals, or else they are liable to the damage accruing from the neglect of them. When factors have unlimited commission to do for their constituents the best they can, they are excusable, though their transactions are attended with lots to their principals; but no factor, who has merely a commission to sell, &c. for another, is excusable for entrusting another person beyond the usual time allowed in the sale of the commodities which he disposes of; in such a case he is answerable to the principal out of his own estate. (1 Bollif. 102.) In commissions at this time, it is common to give the factor power, in express words, to dispose of the merchandise, and deal therein as if it were his own; by which the factor's actions will be executed, though they occasion loss to his principal. Goods remitted to a factor ought to be carefully recieved, and the goods which shall come to his hands; yet if the factor buys goods for his principal, and they receive damage after in his possession, not through his negligence, the principal shall bear the loss; and if a factor he robbed, he shall be discharged in account brought against him by his principal. (4. Rep. 83.) If a factor sells on the usual trust to a person of good credit, who afterwards becomes insolvent, he is discharged; but not if the man's credit was bad at the time of sale. A factor should always be punctual in the advices of his transactions, sales, purchases, freights, and draughts; by exchange: he should never deviate from the orders he receives in the execution of a commission for purchasing goods, either with respect to price or quality; if goods that are bought are sent to a different place from that to which they were ordered, they become the factor's wares, and the merchant maintains them. If a factor buys goods on account of his principal, where he is authorized so to do, the contract between the factor shall oblige the principal to the performance of the bargain; and the principal is the proper person to be prosecuted on non-performance of the contract. But if the factor enters into a charter-party of affreightment with a master of a ship, the contract obliges him only; unless he takes aboard generally his principal's goods, then both the principal and lading become liable for the freight, and not the factor. (Goldb. 137.) It is a general rule, that where a factor, who is authorized to sell goods in his own name, makes the buyer debtor to himself, then he is not answerable to his principal for the debt, if the money be not paid; yet he has a right to receive it, if it be paid, and his receipt is a discharge to the buyer. The factor may compel such payment by action, and the buyer cannot discharge himself by paying, that the principal was indebted to him more than the amount. (Comp. 555, 6.) Where goods are sold by the factor at his own risk, for which he has an additional allowance, the vendor is not answerable to the owner. (Str. 146.) Though a factor has power to sell, and thereby bind his principal, yet he cannot bind or affect the property of the goods by pledging them as a security for his own debt, or non-performance, though there be the formality of a bill of parcels and a receipt. (Str. 148.) A factor that sells a commodity under the price ordered by his principal shall be obliged to make good the difference; and if he purchases goods for another at a limited price, and they rise in value, he secures to himself the advantage, he is obliged to satisfy his principal for damages; or if he makes any advantage of the sale of goods which his principal directed him to purchase, the principal shall recover it from him, and he is liable to be amerced for the fraud. When factors have obtained a profit for their principal, they must be cautious how they dispose of it; for if they act without commission they are responsible; and if a merchant remits goods to his factor, and about a month after draws a bill on him, and the factor having effects in his hands, accepts the bill, but the principal breaks, and the goods are seized in the factor's hands, on behalf of the creditors, it has been judged that the factor must answer the bill, and come in as a creditor so much as he was obliged by reason of his acceptance to pay. If one employs a factor, and entrusts him with the disposal of merchandise, and the factor receives the money, and dies,
FACT

indebted in debts of a higher nature, and it appears by evidence that this money was vested in other goods, and remains unpaid, those goods shall be taken as part of the merchant's and not of the factor's estate; but if the factor has the money, it shall be considered as the factor's estate, and must first answer the debts of superior creditors, &c. (1 Salk. 162.) If a person employs a factor to sell goods, who fails them on credit, and before the money is paid dies indebted more than his estate will pay, this money shall be paid to the principal merchant, and not to the factor's administrator, deducting his commission; for a factor is only as trustee for his principal. (2 Vern. 638.) Bills remitted to a factor or banker, while unpaid, are in the nature of goods unfold; and if the factor become bankrupt must be returned to the principal, subject to such lien as the factor may have thereon. (2 Blac. Rep. 154.) A factor has a lien on goods configned to him, not only for incident charges, but as an item of mutual account, for the general balance due to him, so long as he retains the possession; if he parts with the possession, he parts with his lien. (1 Burr. 489.) 1 Blac. Rep. 114.) If he be surety in a bond for his principal, he has a lien on the price of the goods sold by him for his principal to the amount of the sum for which he is bound. (Cowp. 25.) A factor has no lien on goods for a general balance, unless they come into his actual possession; and if in consideration of goods being configned to him he accepts bills drawn by the confignor, and pay part of the freight, and become insolvent before the bills are due, and before the goods get into his actual possession, the confignor may stop them in transitu. (1 Term Rep. 119.) If a factor accepts bills drawn by his principal upon the faith of confignments agreed to be made by the principal to the factor, and both of them become bankrupts before a cargo configned came into possession of the factor; the factor's assignees have no property in such cargo, and cannot recover the produce of it against the assignees of the principal, if the latter have sold it, and received the purchase-money. (1 Term Rep. 783. 4 Bro. P. C. 57.) The confignor may stop goods in transitu before they get into the hands of the confignee, in case of the insolvency of the confignee; but if the confignor assign the bills of lading to a third person for a valuable consideration, the right of the confignor as against such assignee is divested. There is no distinction between a bill of lading indexed in blank, and an indorsement to a particular person. (4 Bro. P. C. 57. 2 Term Rep. 63. 1 H. Blac. Rep. 357. 2 Term Rep. 674. 3 Term Rep. 467.) If a factor sells goods as his own, by indorsement of the bill of lading, though no delivery is made, the goods being at sea, the vendor shall keep possession, unless fraud appears between him and the factor. (4 Burr. 246. 1 Blac. Rep. 629.) A factor who has money in hand belonging to his principals, and who neglects to insure a ship and goods according to order, shall make good the damage if the ship miscarry; and if he make any composition with the insurers after insurance without orders, he is answerable for the whole insurance. As fidelity and diligence are required from the factor, so the law requires the like from the principal: if, therefore, a merchant remits counter-jevels to his factor, who sells them as true ones, and fullains lofs or damage by imprisonment or other punishment, the principal shall not make satisfaction to the factor but to the party who purchased them. Definition of this kind is called commissioln-lunamen; and traders in this way have current as well as commissio accounts constantly between them, and draw on, remit to, and find commisions to each other only by the intercourse of letters, which, among men of honour are as obligatory and authoritative as all the bonds and ties of law.

FACTORS, in Arithmetic, is a name given to the two numbers which are multiplied one into another; that is, the multiplicand and multiplier; so called because they are to facere productum, make or constitute the product.

FACTORAGE. The factorage or wages, called also commission, is different at different places, and for different voyages: at a medium it may be fixed at about three per cent of the value of the goods bought, before the charge of package, which is paid over and above. When factors make themselves answerable for the debts of those persons with whom they deal, the charges of commission or factorage are, of course, enhanced.

FACTORY, a place where a considerable number of factors reside, to negotiate and officiate for their masters or principals.

The term is chiefly used in speaking of the East Indies, and other parts of Asia, Turkey, Italy, Portugal, &c., whether the European nations send their ships every year, and where they keep factors to buy the commodities of the country, and sell those brought from Europe.

FACTORY is also a denomination applied in some of our manufacturing counties to the places where particular processes of the manufacture are carried on.

FACTUM, in Arithmetic, the product of two quantities multiplied by each other.

FACTUM, in Latin. See Fact.

FACULÆ, in Astronomy, a name given by Scheiner, and others after him, to certain spots on the sun's disc that appear brighter and more lucid than the rest of the body.

The word is Latin, being a diminutive of facs, torch, and supposed to be here applied from their appearing and dissipating by turns.

The faciale or bright spots differ very considerably from the macule or dark spots, in light, colour, figure, magnitude, and duration.

Hevelius assures us, that July the 26th, 1634, he observed a facula that took up a third part of the sun's diameter; and from the observations of the same Hevelius we learn, that the macule frequently change into faciae; but the faciae into macules rarely, if ever. Some authors even contend that all the macules degenerate into faciae before they quite disappear.

Huygens, however, declares he was never able to discover any faciae, though the macule occurred to him very frequently. All the foundation he could see for the notion of faciae, he says, was, that in the darkish clouds which frequently surround the macule, one sometimes discerns little points or sparks brighter than the reil.

Many authors after Kircher and Scheiner have generally represented the sun's body full of bright, fiery spots, which they conceive to be a sort of vesicles in the body of the sun; but Huygens, and others of the latest and best observers, finding, that the telescope discovers nothing of the matter, agree to explode the phenomena of faciae. Their cause these authors attribute to the tremulous agitation of the vapours near our earth; the sun as sometimes shews a little unevenness in the circumference of the sun's disk when viewed through a telescope. Strictly, then, the faciae are not eruptions of fire and flame, but refractions of the sun's rays in the rarier exhalations, which, being condensed in the neighbourhood of that disk, seem to exhibit a light greater than that of the sun. See spots.

FACULTY, a power or ability of performing an action. The term is much used by the ancient philosophers, and still retained in the schools for explaining the actions of natural bodies. Thus, to account for the act of digestion, they suppose a digestive faculty in the stomack; to account for
for motion, they imagine a motive faculty in the nerves, &c. which is only a substituting of one name of an unknown phthisical power for another.

The Faculties or powers of the soul are commonly reputed two, viz. the understanding and will.

Faculty is also applied in the Schools, to the divers parts or members of an university, divided according to the arts or sciences taught or professed there.

There are four faculties in most universities; that of art, which includes the humanities and philosophy, and is much the most ancient and extensive; the second is that of theology; the third, medicine; and the fourth, jurisprudence, or laws. See each under its proper article.

The degrees in the several faculties in the universities are those of Bachelor, Master, and Doctor.

The Faculty is frequently used absolutely, and by way of eminence, for that chiefly studied and taught in any particular place.

Faculty, in Late, denotes a privilege or special power granted to a man by favour, indulgence, and dispensation, to do that which regularly by law he cannot; as to eat flesh upon days prohibited, or to marry without banns first asked, &c.

Faculties, the Court of. See Court of Faculties.

Faculty of Advocates, in Scotland. See Advocate.

FACUSIM, in Geography, a town of Japan, in the island of Ninpion; 55 miles N.E. of Meaco.

FADELA, a town of Fez; 28 miles S.W. of Salee.

FADEH-HOTUN, a town of Corea, on the river Oula. N. lat. 41° 3'. E. long. 125° 44'.

FADLA, a town of Arabia, in the province of Nedsjed; 180 miles N.E. of Mecca.

FAODAL, a small island in the East Indian ocean.

S. lat. 5° 51'. E. long. 132° 37'.

FACES, in Physiology, the residue of the food, which is expelled from the body, after the nutritious parts have been absorbed by the intestines. See Digestion.

FACES, in Chemistry. Excrement, feces, or fecal matter, is the indigible residue of the food, both liquid and solid, mixed or combined with bile and other secretions, during its passage through the alimentary canal.

The eager and unweary search after gold, which distinguished the ancient alchemists, rendered them liable to be imposed upon by the lightest and most foolish coincidences and analogies; hence doubtless it was that the casual and flight resemblance in colour between gold and the most distilling of all substances led them to submit human ordure to various chemical processes, with the expectation of obtaining from it an oil which should have the property of fixing mercury. The details of most of these experiments have suffered the oblivion which they merited, and the discovery of pyrophors by Hovenberg is the only known fact of any importance which has resulted from them. This preparation, which is now obtained by a perfectly inoffensive process, was first procured from the matter remaining in the retort after dry distillation of human excrement.

In the year 1806 a laborious investigation of this substance was undertaken by Berzelius with a view of illustrating the chemical history of the process of digestion, from which we have collected the following particulars. Recent excrement appears to contain neither acid nor alkali in an uncombined state. Its odour is peculiar and remarkably517 fat, but by time it becomes sufficiently fat. When of a medium consistence it loses about three-fourths of its weight, by being dried in a water bath. It is diffusible in water by agitation and maceration, and if strained through a linen cloth in this state, it may be divided into a somewhat turbid fluid and an insubstantial residue. This latter is of a greyish-brown colour, and a very permanently fetid odour. When dried it appears to consist principally of the undigested residue of vegetable, and perhaps also animal food. It amounts to about 7 per cent. of the entire matter. The strained liquid by standing deposits a flamy matter of a yellowish-green colour, which is separable from the fluid portion by filtration. It appears to consist, first of a matter soluble in alcohol, and much resembling the resin of bile; secondly, of a matter insoluble in alcohol, but soluble in water, possessing many of the properties of mucous, and readily putrefying at the same time, exuding the odour of urine; thirdly, of a greenish-grey residue insoluble in water and alcohol, and affording by incineration, a fila. and phlogiston of potash.

The clear liquor, after separation of the flamy matter, is of a light yellow colour, which, by exposure to the air, becomes brown and turbid. By gentle evaporation it deposits crystals of ammoniacal phlogiston of magnesia.

The constituent parts of the remaining fluid are, 1, albumen; 2, resin of bile combined with soda; 3, a peculiar flimsy substance of a reddish-brown colour, that appears to be resin of bile somewhat altered.

The proportions of the above substances, according to Berzelius, are the following:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>73.3</td>
</tr>
<tr>
<td>Vegetable and animal undigested residue</td>
<td>7.0</td>
</tr>
<tr>
<td>Bile</td>
<td>0.9</td>
</tr>
<tr>
<td>Albumen</td>
<td>0.9</td>
</tr>
<tr>
<td>Extractive matter</td>
<td>2.7</td>
</tr>
<tr>
<td>Carbonat of soda</td>
<td>0.9</td>
</tr>
<tr>
<td>Muriat of soda</td>
<td>0.1</td>
</tr>
<tr>
<td>Salpht of soda</td>
<td>0.05</td>
</tr>
<tr>
<td>Ammon. phosphat of magnesia</td>
<td>0.05</td>
</tr>
<tr>
<td>Phosphat of lime</td>
<td>0.1</td>
</tr>
<tr>
<td>Flimsy matter</td>
<td>14.0</td>
</tr>
</tbody>
</table>

The excrements of stall-fed cattle have been examined by M. de Taun and Elinhof. The colour of this substance is yellowish green; its odour is somewhat like that of musk. It contains no excess of acid or alkali; when submitted to the agency of sulphuric acid there is a disengagement and production of acetic acid.

100 parts of recent excrement are reduced, by drying on a water-bath, to 28.

When diffused through water and ignited, there remains behind a yellowish fibrous matter, which appears to be vegetable fibre but little altered. The solution deposits, by standing, a flimsy substance, to which the faces owe their peculiar odour and colour. It is insoluble in water or alcohol; when heated it gives out an odour like that of ox bile. It is scarcely affected by the alkalies; but sulphuric acid develops from it acetic acid, and the oxammoniacal acid renders it yellow.

The fluid remaining, after separation of the above flimsy substance, is at first colourless, but, by exposure to the air, becomes first of a wine yellow, and then of a brown colour. When evaporated to dryness, there remains a brownish matter, of a bitterish taste, insoluble in alcohol but soluble in water. It is not precipitated by infusion of gelatine; it becomes putrid, exuding an ammoniacal odour, and during combustion exhibits the usual characteristics of animal matter.
ter. The fixed parts, after incineration of eight ounces of the entire excrement, were as follow:

- Lime
- Phosphate of lime
- Magnesia
- Iron
- Alumine with some magnesene
- Silex
- Muriate and sulphat of potash

The excrements of carnivorous animals have not hitherto been examined. The dung of dogs (called album Graecum) merits notice on account of its remarkable efficacy in some of the processes of leather-dressing. The great consumption of dung of all kinds in agriculture as a manure. It is also largely employed in the construction of artificial mire-beds. The dung of the large domestic graminivorous quadrupeds is dried and made use of as fuel in those countries that are destitute of coal and wood. The foot arising from this comfumption is the substance from which the Egyptians procure ful ammoniac by simple sublimation; and it is probable that a similar advantage might be taken in other countries.

FAECHDT, in Geography, a river of France, which runs into the Ill, near Guemar, in the department of the Upper Rhine.  

FÆCULA. See Fecula.  

FAENZA, in Geography, a city of Italy, and capital of the department of the Amone, the see of a bishop, suffragan of Ravenna; anciently called Faenza. It was ravaged by Totila, king of the Goths, in the 6th century, and in the 13th ruined by the emperor Frederick II. because it exiled the interlocut of the pope; but afterwards restored by Manfredi. It afterwards fell under the power of the Venetians, the Bolognese, and, at length, under that of the church. In 1708 it was taken by the Imperialists; in 1796 by the French, and afterwards by the troops of the pope, who garrisoned it. In 1797 the pope's troops were defeated and expelled. Although it has an old fort, it has no other defence besides a plain covered curtain with its ditch. It had formerly 15 or 16 churches, or convents. The cathedral stands in the great square, and is adorned with a handsome fleape five stories high, with balustrades. Near the church is a fountain, the basin of which is surrounded by four fine lions of brass, and encompassed with a wrought iron rail. Faenza was famous for its pottery, which took its name from that of the town. It is 20 miles S.W. of Ravenna. N. lat. 44° 18′; E. long. 11° 51′.

FÆOE, an island of Denmark, in the Baltic, near the north coast of Lolland, about 12 miles in circuit, with two or three villages. N. lat. 54° 52′; E. long. 11° 20′.

FAERNO, Gabrieli, in Biography, a Latin poet and philologist, was a native of Cremona. His great learning obtained for him the employment of corrector and revisor of the books in the Vatican library. He was afterwards patronized by the cardinal de Medicis, both while he was cardinal, and when he was elevated to the popedom by the name of Pius IV. Faerno employed all his influence in support of men of worth, integrity, and learning; but he did not long enjoy the opportunity of being thus useful; he died in the prime of life, in 1561, much respected for the amiability and simplicity of his character. His chief work, as a literary man, is entitled "Fabulous centum cx antiqua aucto ribus delecte." Faerino was a skilful critic, and took pains in collating the best MSS. of ancient authors. He edited the Philippics of Cicero and the comedies of Terence. Moreni.

FAG, used for a knot or excrecence in cloth. Stat. 4 Edw. IV. cap. 1. The fag-end of a piece of cloth, or linen, is that in which the weaver ends his piece, and works up his world materials.

Fag-end, in Sea Language, denotes the end of any rope or cord which is become untwisted and loosened by frequent use; to prevent which, the ends of ropes are generally well-fastened by winding a piece of small line or pack-thread around them, which operation is called whipping.

FAGAGNA, in Geography, a town of Italy, in Friuli, eight miles W. of Udina.

FAGAN, in Cactology. Adanson designates the Arca fenulis fagan in his Hist. Senegal.  


Eff. Ch. Calyx four-creft. Petals four, Capulules superior, of two valves and one cell. Seeds solitary. A genus of aromatic, sometimes prickly, shrubs, with alternate or pinnate leaves. Wildenow has twelve species, found in various of the warmer parts of the globe, none of them in Europe.

Linnmeus confounded with his F. Pterota, which is Browne's Jamaica plant, F. Avicenna, Clust. Exot. 185. Lob. Ic. v. 1. 133. Lamarck Encycl. v. 2. 445, which is the original officinal one, a native of China. Lamarck saw a specimen of this last, gathered by Father d'Incavile, in Juffian's herbarium, and corrected the above error. The qualities of this fruit are somewhat aromatic and acrid, whence it was formerly thought an useful rhamitic, or stimulant, but it is now entirely laid aside in practice.

FAGARA, in the Materia Medica, the name of a fruit resembling the cumbes found in the Philippine islands. The part of this fruit which contains the principal virtue is the outer rind; this is tender and blackish, and of an aromatic and somewhat acid taste. When the berries are ripe they easily break, disclose a black, shining, solid kernel, void of taste and shine. The berries, according to Avicenna, are heating and dryin, and good for a cold weak stomach, to help digestion, and are astringent to the bowels. They were once much used, but of late are scarce known in the shops.
FAGGHOT, in Geography, a town of Sweden, in the province of Smaland; 35 miles N.W. of Calmar.

FAGGOT, in Agriculture, is a bundle of any sort of small wood tied up closely together by means of a with, or other kind of ligature. They are mostly made up from the cuttings or thinnings of under-woods, coppices, and hedges, being sold in many districts to the bakers, for the purpose of heating their ovens. They usually fetch a good price in many situations, especially near large towns. In making up these bundles the workmen trim off the superfluous spreading branches from the sides and ends, which gives them a neater appearance. These trimmings are put in the middles of the faggots which are to be made up, by which they appear to greater advantage.

These trimmings are of little or no use in the faggots, and ought to be left on the ground; for being small, they would soon rot there, and would manure the ground so as to be of more advantage to the next growth than is easily imagined. The leaves of the trees falling to the earth, manure it very much; but this is nothing to the advantage of these little pieces of wood; any rotten wood, but in moderate quantity, will turn a common bad earth into good garden mould; and the growth of the young trees is more forwarded by this manure where it is left, than by any other means that can be used to it. We always see the land where wood-flakes have come enriched to a surprising degree by them, and the fame advantage will occur wherever wood of any kind is left to moulder and rot upon the ground. That sort of small wood which is bound up in faggots is called faggot-wood, and sometimes bough-wood. Faggots for fuel are required by 43 Eliz. cap. 14, to contain in compass, besides the knot of the bond, twenty-four inches of affize; and every faggot-flick within the bond shall contain full three feet of affize, except only one flick, which is to be but one foot long, to float or harden the binding.

FaggoT, or Fagot, in Fortification. See Fascine.

Fagot of Steel, expresses the quantity of 120 lb. weight.

Fagott, in the times of Popery in these kingdoms, was a badge worn on the sleeve of the upper garment by such as had recanted and abjured what was then deemed heresy; being put on after the person had carried a faggot, by way of penance, to some appointed place of solemnity. The leaving off this badge was sometimes interpreted a sign of apathy.

Faggots, among Military Men, are ineffective persons who receive no regular pay, nor do any regular duty, but are hired occasionally to appear at a muster, to fill up the companies, hide the real deficiencies thereof, and cheat the king of so much pay, which goes into the officer’s pocket.

Fagiano, in Geography, a town of Naples, in the province of Otranto; six miles E.S.E. of Taranto.

Fagius, Paul, in Biography, a learned German divine, was born at Reinazaber, a town in the Palatinate, in the year 1504. In the course of his education he recommended himself to the notice and esteem of his preceptors by great diligence in his studies. At a very early period he was distinguished for his proficiency in the learned languages and in the Hebrew tongue. He became intimate with Bucer, and the other celebrated reformers. At the age of twenty-three he was obliged to engage in the business of school-master, in which he acquired great reputation, but he was bent on the work of the ministry, to which he looked as the consecration of his wishes, and in 1537 he was invited by the senate of Iline to undertake the pastoral office in that town, and for several years he discharged the duties connected with it with high reputation. Here the plague broke out with violence, during the ravages of which he displayed a noble and benevolent spirit, by reviving the rich, who, from their apprehensions, were led to defer the poor and the afflicted; by establishing a fund for the relief of the distressed, and by engaging the magistrates to make such wife and humane regulations as contributed to lessen the horrors of that dire calamity; and it is related, to his great honour, that Fagius never quitted the scene of infection, but devoted his whole time to the service of the afflicted, personally visiting them, and affording them every relief in his power. He was, however, spared by the hand of Providence, although he saw multitudes falling on his right hand and on his left. The plague reached to Strafsburg, and numbered Wolfgang Capito among its victims, whom he afterwards succeeded in the ministerial functions: and at the same time he exerted all his powers in publishing such works as eminently contributed to the promotion of the interests of religion and literature. In 1546 Frederic II., elector palatine, sent for him to Heidelberg, to conduct the measures proper to bring about a reformation of religion in his dominions, a project which, from some unfavourable circumstances, was obliged to be suspended. He returned to Strafsburg, resumed his ministerial and literary employments, and assisted Bucer and Martyr in the duties of the professorship of theology. In 1548 he was obliged, by the treatment which the Protestant divines experienced from the emperor, to quit Strafsburg, and he fled for safety to England with Bucer, both of whom had received pressing invitations from Cranmer, archbishop of Canterbury. They resided for some time at Lambeth, and it was intended that they should proceed from thence to Cambridge, where they were to be employed as professors, and engaged in completing a new translation of the scriptures. Fagius died, before he had made any progress in the work, in 1550, at the age of 45. During the infamous reign of Mary, his remains, and those of Bucer, were dug up and burnt, a paltry kind of revenge, and worthy of those who inflicted it. His works are chiefly theological, and connected with biblical literature. More. 

Fagloe, in Geography, one of the Faroe islands, in the North sea.

Fagnano, a town of Italy, in the department of the Amona; 10 miles S. of Penser. 

Fago, a town of Spain, in Aragon; 18 miles N.W. of Jaca.

Fagorna, in Anatomy, a conglomerate gland, called also thymus.


Gen. Ch. Cal. Perianth inferior, of five lanceolate, upright, small, deciduous leaves. Cor. Petals five, alternate with the calyx, rounded, equal, with claws about as long as its leaves, the limbus spreading beyond their points. Stam. Filaments ten, filiform, awl-shaped, smooth, erect. longer than the claws; anthers roundish. Pet. Germin superior, with five angles; style awl-shaped, as long as the flower: stigma filiform. Peric. Cypselae ovate, with five deep inrows, and as many obtuse prominent angles, of five compressed cells, and ten valves. Seeds solitary, ovate, smooth.

E. Ch. Calyx of five leaves, Petals five, rounded.

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with claws. Stamens simple. Capsule superior, of ten valves and five cells. Seeds solitary.


FAGOPYRUM. See Polygonum.

FAGOTTO. Ital. in *Myrt., a little fagot.

FAGOTTO, the Italian name for a fagot, is derived from the manner in which it is tied up when taken to pieces, at which time it resembles a fagot, or bundle of ficks; and its French appellation is derived from its low pitch, *Bagot.


Gen. Ch. Cal. Perianth inferior, of one leaf, bell-shaped, in five obtuse, rounded, imbricated, equal segments, membraneous at their margin. Cor. of one petal, funnel-shaped; tube round, gradually dilated upward, persimmon, naked at the mouth, twice times as long as the calyx; limb spreading, in five elliptic-oblong, obtuse, oblique, equal segments, about one-third as long as the tube. Stam. Filaments five, capillary, equal, inserted into the tube, rather shorter than the limb; anthers incumbent, ovate, two-lobed, narrowed, externally convex. *Ptil. German inferior, roundish; filiform simple, thread-like, the length of the corolla; stigma peltate, orbicular, flat. *Peric. Berry ovate, flabby, coated, of two cells. Seeds orbicular, smooth.


1. F. ceylanica, the only known species, was gathered by Thunberg in the island of Ceylon, between Colombo and Galle. The stem is roughy, with thick, leafy, smooth, oftenly quadrangular branches. Leaves opposite, crosseted, in each other in pairs, on very short dilated foot-stalks, obtuse, obtuse, entire, smooth, somewhat flabby, a span long, and three inches wide, tapering to the base. *Stипula small, cloven, crowning the inside of each footstalk, just above its insertion. Flowers terminal, three together, in a sort of umbel, with small, acute, opposite *bracteas, and thick, round, flabby, smooth stalks. Of their colour we have no account, but they are large and handsome, about three inches long, with the aspect of a *Gardenia, to which genus Jullien, with great appearance of probability, grafted the genus might belong, and consequently to his natural order of *Rubiacae. A fine specimen, however, preferred unnamed in the herbarium of the younger Linnaeus, has enabled us to correct, as we hope, what has been said before us upon this subject. By this specimen the affinity of the plant to *Lisanthus is evident. Its stipulation is like the little intraxilaceous rim or border, observable in the larger species of that genus, which perhaps deserves the same name; but in the *Fagraea a positive cloven intraxilaceous stipule is visible. We cannot, however, detect much of a bitter taste in this plant, nor is that flavour strong in *Lisanthus.

FAGUS, from felk, to eat, because its fruit, or at least that of an oak which bore the same name, is supposed to have made a part of the food of mankind in the early ages of the world. Lind. Gen. 456. Schreb. 647. Willd. Sp. Pl. v. 4. 459. Mart. Mill. Dict. v. 2. Sm. Brit. 1027. Jaff. 409. Gerstn. t. 35. (Caflanea; Tourr. t. 352. Gerstn. t. 37. Willd. Sp. Pl. v. 4. 460.) Clas and order, *Monocotyledon. Nat. Ord. Ameritae, Linn. Jaff. Gen. Ch. Male Cal. Perianth bell-shaped, in five, fix or seven deep, equal, acute segments. Cor. none. Stam. Filaments from five to twelve or more, capillary, longer than the calyx; anthers ovate-oblong, vertical, of two cells, burst longitudinally.—Female Cal. Involucrum of one leaf, in four deep, acute, externally muricated segments, containing two or three flowers, permanent; perianth (according to Gartner) superior, of five or fix small, linear, equal, withering leaves. Cor. none. *Ptil. German somewhat triangular, of three or fix cells, with the rudiments of two seeds in each; style short, in three or fix deep divisions; ligaments simple, oblong. *Peric. none, except the enlarged, thick, prickly involucrum. Seeds two or three, ovate or triangular, pointed, corneous.


Obf. Some authors separate *Cassana from *Fagus, chiefly because the male flowers in the former are disposed in a furrow of foot of catkin, but it is by no means a "naked catkin," neither can the same part be termed corolla in this inflorescence and calyx in the other. See the various writers quoted above.

The species are five.

1. F. Cassana. Cheesnut. Lind. Sp. Pl. 14. 16. Engl. Bot. t. 886. *Caflanea vescia; Gerstn. t. 1. 181. Willd. Sp. Pl. v. 4. 460.) "Leaves lanceolate, thrice ferrated, smooth beneath. *Pinnules of the fruit compound and entangled."—Native of the warmer, rather mountainous parts of Europe, where it often composes large forests. It is one of the largest and most long-lived of European trees, sometimes enduring more than a thousand years. The name *Cassana, whence come all its modern appellations, is said to be derived from Karus, a town in Thessaly, the neighbourhood of which abounded with these trees. The timber is extremely durable, at least under cover; the foliage unbraggable, rich and beautiful. In the landscapes of Salvator Rofsf, cheesnut trees are very conspicuous, but most painters prefer the oak for beauty. The nuts produced in England are much smaller than in Spain or Italy. They are used in those countries as a substitute for flour, in bread or puddings, but chiefly by the poor. —The bark of the trunk abounds in deep reticulated fissures. Leaves alternate, flaked, five or eight inches long, veiny, smooth and shining, with numerous sharp shallow ferratures. Flowers in long pendulous yellowish spikes; the male unpleasantly feint,

ed;
produced in May. The fruit ripens rather late in autumn.


3. *F. crenata*. Beech. Linn. Sp. Pl. 1416. Engl. Bot. t. 1836.—Leaves ovate, obtusely serrated, smooth. Prickles of the fruit simple, wavy.—Common in Europe, especially on a rich calcareous soil, blooming in April or May. Grapes do not thrive beneath its shade, but several of the *Oreganum* are there in perfection. The wood is hard, but neither tough nor differing in the open air. This tree makes excellent hedges for shelter, as the leaves remain, though faded, through the winter, and the twisted branches form a very firm fence. The nuts, called Beech-Mall, are eaten by hogs. An oil has been extracted from them, which is sweet, and Hill the poet had a project for bringing it into general use for several purposes, but his scheme failed. The leaves are alternate, spreading, about two inches long, ovate, wavy rather than serrated, shining, finely fringed. *Flowers in ovate, long-tailed, hairy heads, the male lateral, the female terminal.* Nuts with sharp dilated angles, the prickles of their coat simple and piliferous. —The purple-leaved beech is a variety.


5. *F. antarctica*. Antarctic Beech. G. Forl. Magell. Wild. Sp. Pl. v. 4. 460.—Leaves ovate, smooth, doubly and obtusely serrated, reticulated with veins. —Native of Terra del Fuego. A shrub, with spreading irregular branches. Leaves scarcely an inch long, ovate, mostly obtuse, thick and rigid, smooth, doubly and bluntly serrated, reticulated with innumerable veins; their base running down into the footstalk. Flower-flats scattered, above an inch long, single-flowered. *Calyx reddish. Anthers long and narrow.* Fruit, unknown. The young branches are downy, and young leaves glutinous. —We suspect that the *Betula antarctica* of Solander, enumerated by G. Forster, among others from the Bankian herbarium, at the end of his paper on Magellanic plants, is no other than this *Fagus*. His *Cladusus venetus* we know to be our *Ecfallonia ferrata*.—See ESCALLONIA.

*Fagus*, in Gardening, contains plants of the tree kind, of which the species cultivated are: the common beech-tree (*F. sylvatica*); the common choefnut-tree (*F. caucana*); and the dwarf choefnut-tree, or Chinoquin (*F. pumila*).

It is remarked by Martyn, that for some purpose there are two species of the common beech tree, the mountain beech, and the wild beech; “the first of which has a whiter wood than the second; but that this difference arises only from the soil.”

The nurseries have two varieties, one with yellow, and the other with white-striped leaves. And in Germany there is another variety common with dark red leaves, which is called the purple beech. In woods there is likewise a sort with a rougher bark, which is termed hay beech by woodmen in general.

And of the second sort there is a variety cultivated with gold-striped leaves, which is very ornamental.

**Method of Culture.**—These trees are capable of being increased without much difficulty in the methods described below.

**Modes of Culture in the Beech kind.**—These are easily raised by fowing the well-ripened seed, or mail on beds of fine mould prepared for the purpose, either in the early autumn or spring feason, in slight drifts, or broadscales, covering them well in by raking. When the plants come up they should be kept perfectly clear of weeds, and, after two years’ growth, be placed out in nursery rows, two feet, or two feet and a half apart, and at a foot to eighteen or twenty inches distant in the rows; in which situation they should be kept properly cleared of weeds, and have the intervals of the ground well dug over annually, in the autumn or very early spring. Some advice cutting the roots under with a sharp spade at the depth of four or five inches once or twice while in the seed-bed. When they have attained the growth of four or five feet in height, they are proper for being planted out in plantations, shrubberies, and other places, where they are to grow for ornament or timber.

The varieties with striped leaves are to be continued by budding or grafting on common beech stocks, taking care not to plant them where the soil is of the very rich kind.

**Modes of Culture in the Choefnut kind.**—These trees are capable of being increased by fowing or planting the nuts, which have been well ripened here, or such as have been brought from abroad, without being dried in kilns, in the early spring, on beds of fresh earth, is drills two or three inches deep, and about a foot asunder, placing them three or four inches distant, and covering them well in. When the plants appear, they should be kept clear of weeds, and, after they have had two years’ growth in these beds, they should be removed into nursery rows in the beginning of autumn, being planted two feet and a half from row to row, and from one to two feet distant in the rows, great care being taken not to injure their roots in taking them up, unless they happen to have tap roots, which must be cut off in a careful manner.

After they have remained in this nursery four or five years, and have been kept perfectly free from weeds, by hoeing or slightly digging over the intervals between the rows, they will be in a proper state for being finally planted out as ornamental fruit, or forest trees. When they are intended to be planted for the fruit, they should be more frequently transplanted before they are finally set out where they are to grow, but they are not of much importance in this view, as the fruit does not always ripen well in this part of the country.

The varieties with variegated or blotched leaves must be continued by budding or inarching them on flocks of the common kind, which answer perfectly well.

And the third sort may be raised in the same manner from nuts brought in from America, and have the same method of culture afterwards as the others.

The first sort is frequently made use of as timber-trees, and in forming hedges, and the others as ornamental trees in lawns, clumps, borders, and other parts of pleasure-grounds, where they have a fine effect. They succeed on almost any soil, but the bolt on those of the loamy kind. They form good fences on the borders of the sea in many situations, as well as for protection or shelter in gardens and other places.

*PAGAUTAL*, in Mythology, a temple of Jupiter. It is called from *Fagus*, the beech, a tree sacred to Jupiter; because, as some say, the temple was erected in the neighbourhood of a forest of beech; and on this account they lay the
part of mount Equiline, which was formerly called Mons Appius, was afterwards called fagutals; and that Jupiter Fagutalis was the same with Jupiter of Dodona.

FAHACA, in Ichthyology; the Arabians call the Tetrodon lineatus by this name, according to Hafsalquiit.

FAHALFAHARA, in Geography, a town of Persea, in the province of Mecran; 100 miles N. W. of Kidge.

FAHAI, one of the Carolina, or New Philippine islands, in the Pacific ocean.

FAHLERZ, in Mineralogy, is an ore of copper, which see.

FAHLUN, in Geography, a town of Sweden, in the province of Dalecarlia, situated in the midit of rocks and hills, between the two large lakes of Run and Warpen, and containing 1200 houses, and, including the miners, 7000 inhabitants. Excepting two churches of brick, roofed with copper, and a few other houses of the same materials, the buildings are principally of wood and of stone. This town owes its celebrity to the copper mine on its eastern side. The great antiquity of this mine is proved by the earliest records of Sweden, and particularly in the charter of Magnus Smek, which renews its privileges, and considers it as existing from time immemorial; hence we may fairly conclude that it must have been worked eight or nine hundred years. The mine is private property, and consists of 1200 shares, each worth 150 rix-dollars (37l. 10s.). The ore is divided four times a week into 11 equal heaps, eight of which are distributed among eight of the proprietors, and the remaining three are sold by auction; one of which is appropriated to the repairs of the works, another to paying the salaries of the miners and other workmen, and the third, which formerly belonged to the king, is now employed in defraying the expense of new excavations. In this manner the ore is equally divided, until all the proprietors have their respective shares; and then the rotation begins again. The copper of this mine is not found in veins, but in masses, and the bed does not extend an English mile in circumference. The matrix of the ore, or rock, is the Saxum of Linnaeus and pyrites of iron. The richest part of the ore may perhaps yield 20 per cent. of copper; but as the poor and rich parts are intermixed, they give only two per cent. when first brought from the mine, and 12 per cent. when once smelted. Twelve hundred workmen are employed, 600 miners, and the same number in roasting and smelting the ore, making charcoal, and other works above ground. The mouth, or opening of the mine, is perhaps the largest in the world, being 1200 feet in diameter, and not far from an English mile in circumference. The defect is by feet cut in the rock, and sloping so gently that hofses may be employed in bringing up the ore. The galleries are from six to ten feet high, and sufficiently spacious. The perpendicular depth of the mine from the top of the chimney is 1200 feet. Cox's Travels, vol. v.

FAHNELEN, FAKENE, or FAKLEN, among the Germans, a kind of greater fachs which the emperor alone could confer.

This was done by the delivery of a flandard, whereon they had the name of fahnehen; i.e. feudo vacill. We find them mentioned in the golden bull of the emperor Charles IV. anno 1356: "Feudis principum exceptis, & illis que vanilen vulgariter appeliantur, quorum inventum & collusionem foli imperatori, vel regi Romano specialiter referam." Du Cange Gloss. Lat. in voc.

The word is more usually written fahnen.

FAHR, in Geography, a town of Germany, in the principality of Wurzburg, five miles S. W. of Gemunden.

FAHRAAG, a town of Persia, in the province of Farshana; 180 miles N. E. of Schiras.

FAHRENHEIT, GABRIEL DANIEL, in Biography, a native of Hamburgh, known for the thermometer which is graduated according to a standard invented by himself. The time of his birth and that of his death are not accurately known. About the year 1720 the improvement in thermometers, of using mercury instead of spirit of wine, was brought into use, and in 1724, Fahrenheit published "A Differtation on Thermometers." The scale he employed is chiefly used in this country, and in this, the freezing point is marked 32°, and the boiling point 212°, and the interval between these points is divided into 180 equal parts, the remainder of the tube, below 32° and above 212°, is divided into similar parts as far as it extends. From 0° zero below the freezing point, the degrees are marked — or minus. Thus mercury freezes and becomes solid and malleable at —40° or at 72° below the freezing, a degree of cold never experienced naturally but in the very northernmost parts of the world, See Thermometer, Freezing-Mixture. Nov. Hift. Diet.

FAHRAND, a town of Germany, in the New Mark of Brandenburgh; four miles N. of Potsdam.

FAID, or FIEH, a town of Arabia, in the province of Jedjed, 140 miles N. E. of Hagiara. N. lat. 26° 54'.

FAIDA, in our Old Writers, is used for malicious or deadly feud. Leg. Hen. 1. cap. 88.

FAIDIT, ANSEL, or GAUSEM, in Biography, a Troubadour, who had been much esteemed by our Richard when he was count of Poitou, and resided at the court of Provence during the life of his father Henry II. and who accompanied him to Palestine, in the holy war, has left a poem on the death of his benefactor, which we found in the Writings among the MSS. bequeathed to that library by the queen of Sweden, No. 1659, with the original music, by the bard himself, who was as much admired by his contemporaries for setting his poems to music, as writing them: having been fait, in the old language of Provence, to have composed de bons mots, de bons tons, good words, and good tunes. He seduced from a convent a nuns, and married, a beautiful nun, with whom he travelled on foot from one court to another. many years. This lady, besides her personal charms and accomplishments, had a remarkable fine voice, and was much admired for singing her husband's songs. The melody to the verses on the death of Richard is the most ancient which we have been able to find to Provençal words.

FAIDO, in Geography, a town of Switzerland, in the canton of Uri, situated on the Tisino; it is the residence of a bailiff, who remains in office four years with almost unlimited power; 12 miles N. of Bellinzona.

FAIFO, or FAIO, a sea-port town of Cochinchina, situated in a bay of the Chincfe sea. It is a place of great trade, and has an annual fair, which continues about four months. N. lat. 15° 50'. E. long. 103° 10'.

FAILDA, a town of Portugal, in the province of Traslos Montes; seven miles S. of Bisgarza.

FAILLS, in Ferderley, a French term, denoting some failure or flaw in an ordinary, as if it were broken, and a splinter taken from it.

FAILS, in Mining, are short flat pieces of wood, laid on the dropp pieces of temples, across a vein, for forming a floor, on which to lay the refuse of the mine, or for making a gate or gang-way, &c.

FAILURE, or FAILING, a species of bankruptcy, popularly called breaking or slopping payment.
FAI

FAI

Failure of Record, in Law, is used when an action is brought against a man who alleges in his plea matter of record in bar of the action, and endeavours to prove it by the record. The plaintiff replies, nulli turi record; that is, he denies there is any such record. Upon which the defendant has a day given him by the court to bring it in; and if he fails to do it, he is liable to action, and the plaintiff shall have judgment to recover. Term s of Lea y.

Failure of the Strata, in Geology, is a term which Mr. Kirwan uses (Geol. Eff. p. 162) seemingly to denote the sinking down or depression of masses of strata; in which sense it answers to the effect produced by a fault; see that article.

FAINT, or FAINT-ACTION, in Law, is as much as feigned action; that is, such an action as, though the words of the writ be true, yet, for certain causes, the party has no title to recover thereby. By which it differs from false-action, which is that where the words of the writ are false.

Yet sometimes the two are confounded. FAINT Plunder, a fraudulent, false, or collusive manner of pleading, to the deceit of a third person; against which, among other things, was made the statute 3 Edw. I. cap. 29.

FAINT, in the Difillery, the weak spirituous liquor that runs from the still in rectifying the low wines after the proof spirit is run off.

FAINTS denote also the last runnings of all spirits distilled by the alembic. The clearing the worm of these is so essential a point in order to obtaining a pure spirit by the succeeding distillation, that all others are fruitless without it.

FAINTING. See Syncope.

FAIOM. See Fayom.

FAIR, a public place, where merchants, traders, and other persons, from diverse parts, meet on some fixed day in the year, to buy and sell commodities, and to partake of the diversions usually accompanying such assemblies; or it denotes the concourse of persons assembled on such occasions. See Market.

The word fair is formed of the French faires, which signifies the same thing; and faire feome derive from the Latin foras, market; others from the Latin ferae, because fairs were anciently always held in the places where the wakes, or feasts, of the dedications of churches, called Harris, were held; and because it is incident to a fair, that persons shall be privileged from being molested or arrested in it, for any other debt or contract than what was engaged for in the same. (See Stat. 17 Ed. IV. c. 2, made perpetually by 1 R. III. c. 6. See also Stat. 2 Ed. III. c. 15. 5 Ed. III. c. 5. 27 Hen. VI. c. 5. 2 Ed. II. & M. c. 7. 13 Eliz. c. 21.) The Romans called them sünduia. Eric Puteus has a pretty little treatise on the fairs of the Romans, "De Numidian Romanorum," which he calls nova fællerum factura.

Fairs can only be establiished by virtue of the king's grant, or by long and immemorial usage and prescription, which supposes such a grant (2 Inst. 220. 3 Mod. 123); he is also the sole judge where fairs and markets ought to be kept; and if any person set up a fair without the king's authority, a quo warranto lies against him; and the persons who frequent such fairs, &c. may be punished by fine to the king. Fairs are generally kept once or twice in the year, and it has been observed, that, as they were first occasioned by the resort of people to the feast of dedication, they are kept, in most places, on the same day with the wake or festival of that saint to whom the church was dedicated; and for the same reason they were held in the churchyard, till restrained by Stat. 13 Ed. II. R. 2. c. 6. (2 Inst.

221. Blount.) The reason of their being held near some cathedral, church, or monastery, on the anniversary dedication of the church, or on the festival of that saint to whom it was dedicated, seems to have been as follows. When bishops and abbots observed that crowds of people assembled from all places to celebrate the festivities of their patron saints, they took advantage of this circumstance, and applied to the crown for charters to hold fairs at those times, for the accommodation of strangers, and with a view to increase their own revenues by the tolls which their charters authorized them to levy at their fairs. Hence the multitude of attendants increased, some of whom were actuated by religious, and others by commercial views. Many precautions were taken to preserve good order, and to prevent theft and cheating in these ecclesiastico-commercial fairs, some of which are not a little singular. When a fair was held within the precincts of a cathedral or monastery, it was not uncommon to oblige every man to take an oath at the gate, before he was admitted, that he would neither lie, nor steal, nor cheat, while he continued at the fair. (Murator. t. 2. Differt. 30.) Many of these ecclesiastical fairs are still kept in all Polish countries, and many of our own fairs are still held on the same saint's days to whose honour they were originally instituted. Every fair is subject to the regulation of the court of piepowder. The duration of fairs is determined by proclamation, by Stat. 3 Ed. III. c. 15; and if a person shall sell any goods after the time of the fair expires, he shall incur a forfeiture of double the value of the goods sold, one-fourth to the procurator, and the rest to the king. (5 Ed. III. c. 5.) Any citizen of London may carry his goods to any fair or market in England at his pleasure. (See Stat. 3 Hen. VII. c. 9.) If any person is intitled to hold a fair or market, and another is set up within the distance of a third part of twenty miles, either on the same day, or a different day, it is a nuisance, and a new action on the case lies; and also against persons disturbing such as are coming to buy or sell in the fair or market, so that the person holding the fair, &c. loses his toll, (see T. V. t. 1.) or receives prejudice in the profits arising from it. (2 Rol. Abr. 143. 2 Samb. 172. 1 Mod. 69. 1 Rol. Abr. 166. 2 Vent. 25. 22.)

Owners and governors of fairs are to take care that everything be sold according to just weight and measure; for which purpose they may appoint a clerk of the fair or market, who is to mark and allow all such weights, and to take his reasonable and just fees. (4 Inst. 274. Moor. 553. 1 Bulk. 327.) Fairs and markets are forfeitable franchises; as if the owners of them hold them contrary to their charter, as by continuing them longer than the charter admits, by diluting, and by extorting fees and duties where none are due, or more than are justly due. (2 Inst. 220. Finch 154. 3 Mod. 154.) As to their interest, it arises chiefly from tolls, see Tons.

Fairs abroad are either free, or charged with tolls and impositions. The privileges of free fairs consist chiefly,

1. In that all traders, &c. whether natives or foreigners, are allowed to enter the place, and are under the royal safeguard and protection in coming and returning, they and their agents, with their goods, &c. 2. In that the said persons, and their effects, are exempt from all duties, impositions, tolls, and servitudes. 3. That merchants in going to, or returning from, the fair, &c. cannot be arrested, or their goods stopped, &c. It is the sovereign alone that has a right, by his letters patent, to establish fairs, whether free, or subject to duties, and the other ordinary laws and penalties.

Several fairs are held in the open fields, or on heaths and commons,
FAIR.

commoners, under tents, booths, and barracks, erected for the purpose; as Stourbridge-fair, &c. others in places walled in for the purpose, and formed into regular streets, lanes, &c. for the occasion; as the fair of St. Laurence at Paris. Lastly, others are held in the open places and streets of cities; as Bridiold-fair, the fair of St. Germain, &c.

Fairs, particularly free fairs, make a very considerable article in the commerce of Europe, especially that of the Mediterranean or inland parts; as Germany, &c. where the continual passage and re-passage of vessels are impracticable.

The most celebrated fairs in Europe are these: 1. Of Francfort, held twice a year, in spring and autumn; the first commencing the Sunday before Palm-Sunday, and the other in September. Each is declared by sound of bell, and lasts three weeks; the first of which is called the week of acceptance, and the second the week of payment; though many bills of exchange are now payable in the third week, but this must be mentioned, because every bill payable in the fair is, without such a clause, deemed payable in the second week. They are famous for the sale of all kinds of commodities, but particularly an immense quantity of curious books, no where else to be found; and from whence the booksellers throughout all Europe used to furnish themselves. Before each fair there is a catalogue of all the books to be sold at it, printed and dispersed, to call together purchasers, though the learned have generally complained of divers unfair practices therein, as fictitious titles, names of books purely imaginary, &c. beside great faults in the names of the authors, and the titles of the real books. 2. The fairs of Lübeck, which are held thrice a year; one beginning on the first of January, another three weeks after Easter, and a third after Michaelmas; they last twelve days each, and are, at least, as considerable as those of Francfort. 3. The fairs of Novi, a little city in the Milanese, under the dominion of the republic of Genoa. There are four of these in the year; commencing on the first of February, the second of May, the first of August, and second of November. Though the commodities bought and sold here be very considerable, yet, what chiefly contributes to render them so famous is the vast concourse of the most considerable merchants and negociants of the neighbouring kingdoms, for transacting affairs, and settling accounts in matters of bank and exchange. Each of these usually lasts eight days. 4. The fairs of Riga, whereof there are two in the year; one in May, and the other in September. They are much frequented by the English, Dutch, and French ships; as also by others from all parts of the Baltic. The bell time for the sale of goods at Riga is during the fairs. Since the building of the famous city of Peterburgh, these fairs have suffered some diminution. 5. The fair of Archangel; during which, all the trade foreigners have with that city is managed. It continues a month, or six weeks at most; commencing from the middle of August. The Muscovite merchants attend here, from all parts of that vast empire; and the English, Dutch, French, Swedif, Danif, and others ships in the port of that city, on this occasion, ordinarily amount to three hundred. But this is no free fair, as the rest are: the duties of exportation and importation are very strictly paid, and on a very high footing. 6. The fair of St. Germain, one of the suburbs of Paris, commencing on the third of February, and holding till Easter; though it is only free for the first fifteen days. It is frequented by traders with various sorts of cloths and stuffs; and the goldsmiths, jewellers, and toy-men of Paris, have well furnished and hand-some shops in it. 7. The fairs of Lyons, which Monf. Du Chene, in his "Antiquity of Cities," would inflate, from a passage in Strabo, were established by the Romans; though it is certain, the fairs, as they now stand, are of a much later date. There are four in the year, each lasting twenty days, and free for ever. They begin on the first Monday after Low Sunday, the fourth of August, the first of November, and the first Monday after Easter. 8. Fair of Gantbray, a suburb of the city of Falaife, in the Lower Normandy. It is said to have been established by our William the Conqueror, in consideration of his being born at Falaife. It commences on the sixteenth of August, and lasts fifteen days; free by charter, and longer by custom. 9. Fair of Beaicaue, held partly in a city of that name, in Languedoc, and partly in the open country under tents, &c. It commences on the twenty-second of July, and only continues for three days; yet it is the greatest, and most celebrated, of all the fairs in that part of Europe, both for the concourse of strangers from all parts of the world, and for the traffic of all kinds of goods; the money returned, in these three days, amounting sometimes to above six millions of livres. Besides these, there are, or there were, before the late revolution, in France, several other fairs of considerable note; as the four fairs of Rheims, the two of Rouen, two of Bourdeaux, two of Troyes, two of St. Dennis, that of Caen, of Dieppe, and of Toulon, &c.

The fairs of Porto-Bello, Vera Cruz, and the Havanass, are the most considerable of all those in the Spanish West Indies. The two first last as long as the flota and galions continue in those parts; and the last is opened as soon as the flota, or galions, arrive there, upon their return for Spain; this being the place where the two fleets join.

The principal fairs in Great Britain are, Stourbridge-fair, near Cambridge; the two fairs of Bristol; that of Exeter, Wilt, Cheffier, Edinburgh, Weyhill, and Burford fairs, for sheep; Patecras fair, in Staffordshire, for faddle-horses; Barnet fair, near London, for lean and Wchil black cattle; St. Faith's, in Norfolk, for Scots runs; Yarmouth fishing fair for herrings; Ipswich butter fair; that of Woodborough Hill, near Blandford in Dorsetshire, famous for west-country manufactures, Devonshire kerlefs, Wiltshire druggets, &c. two cheese-fairs at Athlon and Chipping Norton; besides many more fairs and weekly markef in different parts of the kingdom. See Market.

FAIR, in Sea Language, is used for the disposition of the wind, when it is favourable to a ship's course, in opposition to that which is contrary or foul. The term fair is more comprehensive than large, and includes about sixteen or eighteen points of the compass; whereas large is confined to the beam or quarter, that is, to a wind which crosses the keel at right angles, or obliquely from the stern, but never to one right a-tern. Falconer's Marine Dic.

FAIR-WAY, the path or channel of a narrow bay, river, or haven, in which ships usually advance in their passage up and down; so that if any vessels are anchored therein, they are said to lie in the fair-way. Falconer.

FAIR-CURVES, in Ship Building, is a winding line, used in delineating ships, whose shape is varied, according to the part of the ship which it is intended to describe.

FAIR Maids of Kent, in Gardening, a common name given to a species of ranunculus. See Ranunculus.

FAIR-Foreland, or Ikeel-Hook, in Geography, the N.W. point of Prince Charles's island, in the Northern ocean; N. lat. 78° 5'.

FAIR Island, or Fatrai, an island in the North sea, lying
lying between Shetland and Orkney, 24 miles from the former, and 50 from the latter. It is more than three miles from north-east to south-west, and nearly two miles in breadth, consisting of high and barren rocks, which are interspersed with some sheep pastures. It has two harbours for small boats, and contains about 160 inhabitants, who chiefly subsist by fishing. On the coast of this island the duke of Medina Sidonia, commander of the Spanish Armada, was shipwrecked, A.D. 1588.

Fair Anselm, a river of Canada, which runs from Wapafaga to lake St. John.

Fair Picking, in Law. See Beau-keeper.

Fair Aps in Zoology. See Simia Aequana.

Fairfax, Robert, doctor in music, in Biography, an eminent English composer during the reigns of Henry VII. and Henry VIII. He had his doctor's degree at Cambridge, and was incorporated at Oxford in the year 1511. He was of the Yorkshire family of Fairfax, and a very valuable musical MS. is preserved which once appertained to the subject of this article, and was afterwards in the collection of general Fairfax, upon whose death it made a part of the Threrosy collection, at the sale of which it was purchased by John White, the Quaker, of Newgate street, who exclusively dealt in straw hats for ladies. He was a great collector of scarce and curious things of all kinds, among which the music book of Dr. Fairfax was a rarity, with the loan of which we were obligingly indulged. It contains of a collection of the most ancient English songs, to which the music has been preferred. The writing is very clear and intelligible for the period when it was transcribed, though the time of the musical characters, from the want of bars, and the use of ligatures and prolusion, with a mixture of red notes for diminution, is sometimes difficult to ascertain. We fear the whole of this curious MS. by which we were enabled to judge of the progress which had been made in secular music by our countrymen, at the beginning of the 16th century; which, to say the truth, was not very great; the leading and fundamental laws of harmony were not violated; 5ths and 8ths in succession were sedulously avoided; but there appear no device, no grace, invention, or melody. The composers of these songs are:—William of Newark, Sir Sheringham, Edmund Turgis, Tudor, or Tudor, Gilbert Banelder, Browne, Richard Davy, William Cornyne, junior, Sir Thomas Phelypeus, and Robert Fairfax. But little is known now concerning these musicians, except that Turgis is a name which occurs among the musicians of Henry VI. Tudor was author of several compositions in the music book of prince Henry, afterwards Henry VIII. Cornyne was of Henry VII.'s chapel; and Fairfax was admitted to a doctor's degree in music, at Cambridge; but as he is not styled doctor in this MS. we may reasonably suppose his compositions in it to have been anterior to his receiving that honour in the university.

Most of these musicians seem to have been merely secular composers, as we have met with none of their names, except that of Fairfax, among those for the church. The music of these ditties is fair, what uncomprehended; yet it is still better than the poetry: but this may be accounted for, by the frequent changes of our national language, which was never seriously cultivated till the reign of queen Elizabeth. The Saxons, who dispossessed the Britons of the greater part of the island, we find, from Bede's account of Cædmon, had poetry, though not rhyme, in the seventh century; for he repeatedly quotes the compositions of Cædmon carmina, poemata, and in one place versus. No traces, however, of rhyme, or metre, can be found in our language, till four years after the conquest, at which time French was forced upon us, and till the reign of Edward III. it was the practice in all schools to construe Latin into Norman French; a language which was fashionable at our court, even before the time of William the Conqueror; as Edward the Confessor, who had been brought up in the court of Normandy, encouraged many Normans to follow him into England.

In the thirty-sixth year of Edward III., however, a law was made, "That all pleas in the court of the king, or of any other lord, shall be pleaded and adjudged in the English tongue; and the realm recited in the preamble was, that the French tongue was too much unknown." And yet for near sixty years afterwards the proceedings in parliament appear to have been in French.

The English of Robert of Gloucester, who flourished about 1265, during the reigns of Henry III. and Edward I., is more Saxon than Norman; however, it would not be very difficult to read, if the characters in which it is printed had been those in present use, instead of Saxon, with which it abounded. The language of Trevor, 1382, is not very intelligible, if the Æ be regarded as a g, for which we believe it was originally meant. About the first year of Henry VI., 1422, French and English seem pretty equally balanced, and to have been used indiscriminately; however, very little improvement was made in our language and pronunciation from the time of Edward IV. to that of Henry VIII. Indeed, few English songs are to be found which were set to original music during that period; it having been the fashion for the great to sing none but French words, as appears by the music book of Prince Henry, son of Henry VII., in which all the songs are in French, Italian, or Latin.

It was so much the custom for our old poets to write new words to old tunes, that there was little business for a composer. These tunes, like those of the Improvisatori of Italy at present, being very simple, and little more airy than the chants of the church, required no teaching, and were an easy and ready vehicle for the bard who wished to get at the heart of his audience, or at least to engage its attention by the blinding of his own art, not that of another. For metrical romances, and historical ballads of great length, this kind of plain and familiar melody was best adapted; as it had no fear any other effect than just to render the tone of the narrator's voice a little longer and louder, and consequently more articulate and distinct than in common speech.

Fairfax, Edward, an English poet, was son of Sir Thomas Fairfax, of Denton, in Yorkshire; by some writers he has been represented as illegitimate, but later biographers, upon apparently good authority, have refuted the assertion. His education was liberal, and his literary acquirements very considerable. He entered into no profession, but is supposed to have rendered himself useful to his brother lord Fairfax, by the education of his children, and in the management of his estate. He published a work on " Demology," in which he treats on witchcraft, and shews that he was not free from the credulity and superition of the age in which he lived. He is known as a poet by a translation of "Tassio's Godfrey of Bouillon," which was dedicated to queen Elizabeth, in the year 1620. The translation is given in flanzas of eight lines, and it rendered the original line by line. Mr. Fairfax wrote a history of Edward the Black Prince, and some eclogues; of the first nothing is known, and of the others, only the fourth, which was printed in the " Mufe's Library," 1555. He died about the year 1632, leaving behind him a son named William, who translated Diogenes Laertius. Biog. Brit.
FAI

FAIRFAX, THOMAS, lord, general of the Parliament's army in the civil wars of Charles I. was eldest son of Ferdinand lord Fairfax, and born in 161. He was educated at St. John's college, Cambridge; from thence he went to Holland, and served as a volunteer with the English troops under Horatio lord Vere, with whom he was at the taking of Boisle-Duc. On his return he retired to the country, and married the daughter of lord Vere, by whom he was afterwards infuriated to take a decided part against the royalty. When actual hostilities broke out, he was made general of the horse under his father. At first they sustained several signal defeats. Their valour, enterprise, and zeal were, however, very conspicuous, and when the army was new-modelled, Fairfax was unanimously appointed to succeed the earl of Essex as general; and in the year 1645, when the two parties met at Nafley, he gained a complete and most decisive victory over the royal army. It was his character to be animated, during action, with a spirit which did not seem to belong to his ordinary temper, and which rife to enthusiasm. He pursued his successes with vigour, and was every where triumphant, and, to his honour it is spoken, he uniformly conducted himself with humanity, and exhibited a decided concern for the interests of literature, so that on the surrender of Oxford he diligently preferred the Bodleian library and other places from pillage. It is recorded, that the university suffered vastly less from the rebels, as they were then called, than from the royalists.

After this Fairfax joined the army agitators, advanced to London, and joined in the restoration of the seceding members, which destroyed all parliamentary independence. He behaved with respect towards the King, and seemed dextrous of yielding to the throne; nevertheless he concurred in the declaration of the army to support the vote of the commons for no farther addresses or application to him. He succeded his father, in March 1648, in his titles, and thus united the hereditary dignity of the peerage with the honours which he had acquired by his bravery. He now refixed his arms, and acted with his usual vigour. He was engaged in the siege of Colchester, which had been occupied by the insurgents; this place held out eleven weeks, when it surrendered without conditions. On this occasion lord Fairfax, contrary to his general character, ordered two brave men, sir Charles Lucas and sir George Lide, whom he considered as soldiers of fortune, to be shot. Returning to London, he took up his quarters at Whitehall, and prepared the way, by over-awing and purging the parliament, for the king's trial. He was among the first of those nominated for the king's judges, but he refused to act, and it was expected he would have interfered to prevent the execution, but it was said that he was kept back in prayer and conference at major Harrison's apartments till the fatal blow was struck.

To soothe his resentment he was appointed general in chief of the forces in England and Ireland; and under this commission he suppressed the levellers, who were become formidable in Oxfordshire. In 1650 the Scottish nation declared for Charles II. when it was determined to make war upon that country, and Fairfax was looked to for this purpose, but chose rather to lay down his arms, and retired into the country with a penion of 500l. per annum. At the end of the restoration he determined to make peace with the exiled king, and was at the head of the committee appointed to wait upon him at the Hague, to invite him to return and resume his office. He was well received, and having performed the commission entrusted to him, he retired into the country, where he died, in 1671, in the sixtieth year of his age. Lord Fairfax was of a manly aspect, gloomy but gentle in his disposition, sincere, open, disinterested, liberal in his sentiments, a lover and patron of learning, but possessor of moderate talents, and unfit for taking a lead in any affair but those of the army. B. G. Brit.

FAIRFIELD, the south-westernmost county of Connecticut, bounded W. by the state of New York, E. by New Haven county, N. by Litchfield, and S. by Long Island found. It is divided into 13 townships, of which Fairfield and Danbury are the chief; and contains 38,288 inhabitants, including 276 slaves. It is separated from New Haven county and part of Litchfield county by Stratford river. The other parts of the county are watered by several small streams. Several harbours and small inlets lie along the found, in the towns of Greenwich, Stamford, Norwalk, Fairfield, and Stratford. The face of the country is rough, and the soil is good. Alto, a poll-town and port of entry of Connecticut, and capital of the above county, the "Unquowa" of the Indians, pleasantly situated on Mill run, a little above its entrance into Long Island found, 22 miles S.W. by W. of New Haven, and 64 from New York. It contains about 200 houses, and 3730 inhabitants, a neat congressional church, and a court-house. About 4 miles N.W. of the centre of the town is the beautiful parish of Greenwich, in which is a flourishing academy. This town was settled from Weathersfield in 1639. It carries on a considerable trade to the West Indies. Alto, a county in the state of Ohio. Alto, a township in Kennebec county, Maine, on the S.W. bank of Kennebec river, 50 miles from Canaan and opposite to Hancock, 7 miles from Fort Halifax, and 225 miles N.E. of Boston. It contains 372 inhabitants. Alto, a new township in Herkimer county, New York; containing 2656 inhabitants. Alto, a poll-town in Franklin county, Vermont, E. of St. Albans; containing 911 inhabitants. It is 13 miles S. of the Canada line, and as far from the nearest part of lake Champlain. Alto, a township in Washington county, New York, containing 591 inhabitants. Alto, a township in Cumberland county, New Jersey, on Cohanzie creek, and at the head of Black creek; 25 miles E. by S. of Salem, in Salem county. Alto, a township in Wellmorsland county, Pennsylvania, containing 1363 inhabitants. Alto, a district of South Carolina, between Wateree river, which separates it from Lancaster county, and Broad river, which divides it from Newbury and Union districts. Its chief town is Winniborough.

FAIFORD, a market town in the hundred of Brightwells Barrow, Gloucestershire, England, is situated on the banks of the river Cleve; and derives its name from an old ford over that river near its confluence with the Thames. The celebrity of this town has arisen more from the beauty of its church, and the very fine painted glass of which is that is the repository, than from any other circumstance. The church, dedicated to the Virgin Mary, is a fine specimen of the church of architecture of the fifteenth century. It consists of a lofty nave, a chancel, and side aisles, with a tower rising from the centre. The internal architecture is extremely fine and highly embellished: the aisles are divided from the nave by light fluted pillars, sustaining four arches on each side, with a range of windows.
windows above them in the upper part of the nave. The
aisles are continued parallel with the chancel, with which is
a communication by two arches of equal height. A bea-
"tiful oak screen surrounds the chancel, ornamented with
finely carved tabernacle-work, and having flails in the same
style. On the north side of the altar are three niches, or
subsidia, used in the Catholic times by the officiating priests.
This elegant church, 120 feet in length, and 55 in breadth,
was erected to John Tame, an opulent merchant of Lon-
don, who, about the year 1492, is recorded to have cap-
tured a vessel bound from a Flemish port to Italy and laden
with painted glass, which, agreeably to the expense piety
of the times, he determined to put up in a large edifice ex-
pressly built for its reception. The glass was disposed in
twenty-eight windows, with four or more compartments in
each: but in several of them the figures are now mutilated
or misplaced. The principal subjects are scriptural, and
display the most important events in the life of our Saviour,
with a few of the more remarkable transfigurations recorded in
the Old Testament. The church contains a variety of
monuments and sepulchral inscriptions. In the north aisle is
a table tomb of Italian marble to the memory of John Tame,
the beneficent founder of this edifice, and Alice his
wife.

The town consists of two streets; the buildings in general
are neat and regular: here are three bridges over the
river Colne. Among many charitable institutions is a free-
school, established by the produce of money expended in the
purchase of lands, and bringing in about forty pounds an-
nually, purpunt to the bequests of the Hon. Elizabeth
Ferner, and Mary Barker, spinster. Two fairs are held an-
nually, and a weekly market on Thursdays; originally
granted by Henry III. in 1208, and renewed and confirmed
by a charter procured in 1688, through the intereh of And-
rew Barker, esq. Fairford is 75 miles distant from Lon-
don; the population of the parish in 1801 was returned at
1326; and the number of houses at 273.

Near the church was anciently a monastic residence,
erected by the earls of Warwick, and called Beauchamp and
Warwick court. This appears to have been rebuilt by the
Tames, as Leland mentions 48 a faymulation of the Tames,
hard by the chiche-yards, built thoroughly by
John Tame and Edmund Tame: the back thereof goth to
the very bridge of Fairford." This edifice was pulled
down by Andrew Barker, esq. who, with the materials,
erected at a few long distances, the present manor house,
which is a spacious and convenient building, situated in a
pleasant park, and now inhabited by John Raymond
Barker, esq. who has considerably improved it.

Two miles north from Fairford is Quenington, or Quen-
ington, a small village, remarkable for the architecture of its
church, which is a small low building, displaying vestiges of great antiquity; though it has apparently under-
gone considerable alterations during the two last cen-
turies.

About three miles from Fairford is the grand canal which
unites the rivers Severn and Thames. Rudge's History of

FAIRHAVEN, a town of America, in Bristol county,
Mafsachusetts, lying on the N.W. side of Buzzard's bay,
and on the eastern side of Acculnet river, opposite to Bed-
ford. N. lat. 41° 34'. W. long. 70° 56'.—Allo, a con-
venient port-town in Rutland county, Vermont, N.W. of
Poultney, containing 421 inhabitants, and 51 miles N. of
Bennington.—Allo, a bay on the N.W. coast of Spitzber-
gen. N. lat. 79° 50'. E. long. 63'.

FAIRHEAD, a cape of Ireland, on the northern coast
of the county of Antrim, opposite the island of Rag-
bery. It forms part of that interfering basaltic region, so
frequently referred to in geological controversies. It is
supposed to be the Robogborium Promontorium of Ptolemy,
and its Irish name is Ben-more, or the great promontory,
a name to which it seems well entitled. It and the promon-
ty of Bengore island at the distance of eight miles from
each other: both formed on a great and extensive scale, both
abrupt to the sea, and abundantly exposed to observation;
and each in its kind exhibiting noble arrangements of the
different species of columnar basalt. Fairhead rises its
lofty summit more than five hundred feet above the sea,
forming the eastern termination of Ballycastle bay. It
presents to view a vast mass of rude columnar stones, the
forms of which are extremely grotesque, many of them ex-
ceeding two hundred feet in length, and the texture so
crude as to resemble an imperfect compact granite, rather
than the uniform fine grain of the Giant's cause-way basalt.
At the base of these gigantic columns lies a wild waste of
natural ruins, of an enormous size, which, in the course of
successive ages, have been tumbled down from their foun-
dation by storms, or some more powerful operations of
nature. These massive bodies have sometimes withstood the
shock of their fall, and often lie in groups and clumps of
pillars, resembling many of the varieties of artificial ru-
ins, and forming a very novel and striking landscape. A savage
wildness characterizes this great promontory, at the foot of
the which the ocean rages with uncommon fury. Searce a sin-
gle mark of vegetation has yet crept over the hard rock to
diversify its colouring, but one uniform greynefs clothes the
scene all around. Upon the whole it makes a fine contrast
with the beautiful capes of Bengore, where the varied
brown tints of the pillars, enlivened by the red and green
tints of ochre and grails, call a degree of life and cheerful-
ness over the different objects. Dr. Hamilton says that, from
attentive observation, there is reason to imagine that this
enormous pile rests on the foible usally attendant on beds of
sea-coal; and that the lbatta of the Ballycastle coal pits
extend entirely under the promontory of Fairhead.

This cape is in long. 6° 2'. W. from Greenwich, lat. 55° 44'.
N. Hamilton's Antrim.

FAIRLEE, a township of America, in Orange county,
Vermont, on the W. bank of Connecticut river, 16 miles N.
of Dartmouth college. This township, which is hilly but
having a good soil, is divided into E. Fairlee, containing
435 inhabitants, and W. Fairlee, including 371.

FAIRLEY, a town of Scotland, in the county of ayr; 11
miles N.W. of Irvine.

Fairley Road, a narrow strait of Scotland, in the frith
of Clyde, between the islands of Cumbra and the county of
Ayr.

FAIRNESS Sound, a harbour on the W. coast of
Eday, one of the Orkney islands.

FAIRY DUNES, an island of America, in 45° N. long.

FAIRY, a term frequently occurring in ancient tradi-
tions and romances, denoting a kind of genius, or imagi-
nary deities, conversant on earth, and distinguished by an
abundance of fantastical actions and offices, either good or
evill.

The spirits, according to these traditions, are peculiar
species of divinities, that have but little relation to any of
those of the ancient Greeks and Romans, unless, perhaps, to the latter; though others will not have them ranked among deities, but suppose them an intermediate kind of beings, neither gods, nor angels, nor men, nor devils.

They are of oriental extraction, and seem to have been invented by the Persians and Arabs, whole history and religion abound with tales of fairies and dragons. The Persians call them Perin, and the Arabs Gin; having a peculiar country which they suppose them to inhabit, called Ginnidian, and, by us, Fairy Land. Our famous countryman Spenser's matter-works, the Fairy Queen, is an epic poem under the personas and characters of fairies.

Fairy Circles, or Rings, an expression by which certain spots, frequently to be observed upon the grass in the fields, are commonly denoted. The spots consist of grass much more green and more luxuriant than the rest of the field. The figure of the spot is sometimes circular; sometimes an area either circular, or nearly circular, is peculiarly luxuriant throughout its whole surface; but it more commonly consists of a circular or nearly circular zone of luxuriant grass, including a space of the same kind of coloured grass as that which surrounds the zone. In this latter, and by far more frequent cases, the circular zone is seldom complete, generally consisting of an arch or segment, part of which often bends its direction in an irregular manner.

The size of these spots varies considerably. When the spot is luxuriant throughout, its diameter generally is very small; but the circular zones, which are from two inches to a foot or more in breadth, are the arches of very different circles, the radius of their curvature varying from a few inches to ten feet and upwards.

These singular appearances have been long noticed, not only by shepherds and labourers in the field, but likewise by philosophers and naturalists, who have endeavoured to examine all their peculiarities, for the purpose of investigating their nature and origin.

With respect to the old vulgar opinion relative to the origin of these spots, we need not say any thing, the absurdity of it being pretty well manifest by their denomination; but of the scientific opinions it is incumbent upon us to give a distinct and satisfactory account.

Two different opinions have been principally advanced by philosophers with respect to the origin of these spots, and both opinions are grounded upon experiments and observations. The fairy circles were for a long time supposed to be the effects of lightning; but they were afterwards attributed to the growth of fungi: and this latter opinion seems upon the whole to be the most probable, especially in the manner in which it has been lately illustrated by Dr. Wallis.

One of the early volumes of the Philosophical Transactions contains the following observations of Mr. Jeffop.

"I have," he says, "often been puzzled to give an account of those phenomena which are commonly called fairy circles. I have seen many of them, and those of two sorts: one sort bare, of seven or eight yards in diameter, making a round path, something more than a foot broad, with green grass in the middle; the others like them, but of several bignesses, and encompassed with a circumference of grass, about the same breadth, much frether and greener than that in the middle. But my worthy friend Mr. Walker gave me full satisfaction from his own experience: it was his chance one day to walk out among some mowing-grasfs (to which he had been but a little while before) after a great storm of thunder and lightning, which seemed by the noise and flashes to have been very near; he presently observed a round circle, of about four or five yards diameter, the rim whereof was about a foot broad, newly burnt bare, as the colour and brittleness of the grasfs roots did plainly testify. He knew not what to ascribe it unto but to the lightning, which, besides the odd capricious remarkable in that fire in particular, might, without any wonder, like all other fires, move round and burn more in the extremities than the middle. After the grasfs was moved, the next year it came up more fresh and green in the place burnt than in the middle, and at mowing-time was much taller and ranker."

Dr. Priestley, at the end of his History of Electricity, where he relates his original electrical experiments, describes, amongst others, the effects which were produced by the discharges of a battery upon several substances, especially upon metallic surfaces, which he sometimes covered with water. The experiment which principally relates to our present subject is as follows.

"I then laid, the docile says, to more water upon the copper, but so as only to reach it; for the surface, being convex, would not allow it to be a great quantity; and upon taking the explosion, I found no cirrus, but several beautiful circular spots melted very deep, one of which was much larger than the rest. These experiments seem to shew that the electric matter meets with a consideruble resistance, in passing through water, which confines its excursion more than the air; and that, by such a condensation, its force is greatly increased, to as to have deeper impressions upon the metal than when it had passed only through the air. In like manner, if two pieces of metal be placed nearly in contact, or if they be light, and one of them be upon the other, the impression made upon both of them by the discharge of the battery passing through them will be considerably deeper than it would have been if the electric matter had not been confined to so small a compass as the points in contact.

To account for the formation of these concentric circles nothing seems to be necessary but the supposition of the eläcity of the electric fluid, whereby its particles repel one another. For then, supposing a quantity of electric matter to issue from one piece of metal to another through the air, it will endeavourage to spread, but will be confined in its passage by the surrounding electric medium and the strong attraction of the opposite metal. If this piece of metal have a flat surface, or one that is nearly so, the fluid will be attracted by it pretty equally, within a certain space, so that the mutual repulsion of its particles will have room to exert itself, and produce a division of the whole quantity; and as this repulsion is the same in all directions, the effect must be its throwing itself into a circle, or several concentric circles, on its entering the opposite piece of metal, and consequently melting it in that form. For the same reason, the circles themselves will consist of separate dots, each of which might have been caused by the fluid in another hollow circle, but being so small the fusion of the metal could not shew that circumstance."

And a little farther on the doctor says, "communicating this experiment to Dr. Price, he suggested to me, that the circles, called fairy rings, which consist of grasfs of deeper green in pasture fields, and which have by some been imagined to be occasioned by lightning, might be analogous to the circles above-mentioned, but that they want a central spot. I have since examined one of these rings. It was about a yard in diameter, the ring itself about a quarter of a yard broad, and equally so in the whole circumference; but there was no appearance of any thing to correspond to the central spot."

Notwithstanding these experiments and these conjectures,
it was not long after the publication of Dr. Priestley's History of Electricity, that the fairy circles began to be attributed to the growth of fungi; for Mr. Cavallo, in the first edition of his Treatise on Electricity, which was published in the year 1777, describes the method of forming, by means of the electrical apparatus, such rings as were discovered by Dr. Priestley, and which have been already described; after which he says, "I have given these spots the appellation of fairy circles, on account that they bear some resemblance to the spots so called, which are often observed upon the grass in the fields. These, which we may call natural fairy circles in the fields, it has been thought to be effected by lightning, on account of their bearing some resemblance to the above-mentioned circles produced by electricity; the supposition, however, seems not very probable; for the spots in the fields, called fairy circles, have no central spot, no concentric circles, neither are they always of a circular figure; and, as I am informed, they seem to be rather beds of mushrooms, than the effects of lightning."

In the year 1807 Dr. Wollaston presented a paper to the Royal Society, containing various valuable observations relative to the fairy circles, and from this paper, which is contained in the volume of the Philosophical Transactions for the above-mentioned year, we shall now transcribe such passages as seem absolutely necessary to illustrate the subject of this article.

"That," he says, "which first attracted my notice, was the position of certain fungi, which are always to be found growing upon these circles, if examined in a proper season. In the case of mushrooms, I found them to be solely at the external margin of the dark ring of grafts. The breadth of the ring in that instance, measured from them towards the centre, was about twelve or fourteen inches, while the mushrooms themselves covered an exterior ring about four or five inches broad.

"The position of these mushrooms led me to conjecture that progressive increase, from a central point, was the probable mode of formation of the ring. I was the more inclined to this hypothesis, when I found that a second species of fungus presented a similar arrangement, with respect to the relative position of the ring and fungi; for I observed, that in all instances the present appearance of fungi was upon the exterior border of a dark ring of grafts. I thought it not improbable that the soil, which had once contributed to the support of fungi, might be so exhausted of some peculiar substance necessary for their production, as to be rendered incapable of producing a second crop of that singular class of vegetables. The second year's crop would consequently appear in a small ring surrounding the original centre of vegetation, and at every succeeding year the decrease of nutriment on one side would necessarily cause the new roots to extend themselves slowly in the opposite direction, and would occasion the circle of fungi continually to proceed by annual enlargement from the centre outwards. An appearance of luxuriance of the graft would follow as a natural consequence, as the soil of an interior circle would always be enriched by the decayed roots of fungi of the preceding year's growth."

In the sequel Dr. Wollaston relates some observations of Dr. Withering, who had already attributed these spots to the growth of fungi, but he confirmed his conjecture to one species only of agaric; (viz. the Ag. arcades of his arrangement,) I am satisfied," Dr. Withering says, "that the bare and brown, or highly clothed and verdant circles in pasture fields called fairy-rings, are caused by the growth of this agaric."—"Where the ring is brown and almost bare, by digging up the foil to the depth of about two inches, the spawn of the fungus will be found of a greyish white colour, but where the grafts have again grown green and rank, I have never found any of the spawn existing." Dr. Wollaston then continues in the following manner. "Hence he says, "Dr. Withering frequently repeated this examination of the soil, he would have corrected the last remark, which is not universally true; as the grafts may at some period be found luxuriant even over the undecayed spawn. During the growth of the fungi, they so entirely absorb all nutriment from the soil beneath, that the herbage is for a while destroyed, and a ring appears bare of grafts, surrounding the dark ring. If a transverse section be made of the soil beneath the ring at this time, the part beneath the fungi appears paler than the soi! on either side of it, but that which is beneath the interior circle of dark grafts is found, on the contrary, to be considerably darker than the general surrounding soil. But in the course of a few weeks after the fungi have ceased to appear, the soil where they fed grows darker, and the grafts soon vegetates again with peculiar vigour; so that I have seen the surface covered with dark grafts, although the darkened soil has not exceeded half an inch in thickness, while that beneath has continued white with spawn for about two inches in depth.

"For the purpose of observing the progress of various circles, I marked them three or four years in succession, by incisions of different kinds, by which I could distinguish clearly the successive annual increase, and I found it in varying different circles from eight inches to as much as two feet. The broadest rings that I have seen were those of the common mushroom (Ag. campytris); the narrowest are the most frequent, and are those of the champignon (Ag. arcades of Dr. Withering). The mushroom accordingly makes circles of largest diameter, but the latter of the champignon are most regular. There are, however, as many as three other fungi which exhibit the same mode of extension, and produce the same effect upon the herbage. These are the Ag. teretus, Ag. procerius, and the Lycoperdon botvita, the latter of which is far more common than the two last mentioned agarics.

"There is one circumstance that may frequently be observed respecting these circles, which can satisfactorily be accounted for, according to the preceding hypothesis of the cause of their increase, and may be considered as a confirmation of its truth. Whenever two adjacent circles are found to interfere, they not only do not cross each other, but both circles are invariably obliterated between the points of contact; at half in more than twenty cases; I have seen no one instance to the contrary. The extinction occasioned by each obliterates the progress of the other, and both are staved."
from the circumstance of the interview. It is two miles distant from Fontarabia.

FAISTENBERGER, ANTHONY and JOSEPH, in Biography, two brothers, landscape painters; they both imitated Gaspé Poulin with considerable success, and their works are so much alike, that with difficulty the difference is discernible. They wrought together at the court of Vienna in several large works, and were likewise employed by many of the princes of the empire. Anthony died in 1722, aged 44.

FAITH, FACTUM, in Law, is used for a writing lawfully executed to bind the parties thereto. See Deed.

FAITH, Faith, in Antiquity, as denoting honesty or fidelity, was deified by the Romans, and represented with an erect open air, and dressed in a thin robe, so fine, that one might see through it. This deity is also represented as very old and grey-headed; and she appears on medals as giving her hand, and sometimes only by two hands joined together. The oath made in the name of this deity, or "Jupiter Fidius," who was the same, was of all oaths the most inviolable. The temple of Faith erected by Calatus was in the Capitol, near that of Jupiter; and if we admit the testimony of Dionysius Hacianmepin, and of Plutarch, the half who erected a temple to this deity was Numa Pompilius. He likewise ordered the priests, whom he set over the worship of this deity, to wear white velements when they offered sacrifices. Dionysius Hacianmepin, (l. ii. c. 5.) has stated the reasons why Numa Pompilius gave Faith a place among the venerable Roman divinities. This was done in order to engage the people to observe mutual fidelity and truth in their contracts with one another. With this view he deified Faith, and consecrated a temple to this divinity. Hence Faith came to be so revered, and held in such awe, as to have greater influence with the Romans than witness and oaths. Hercules was represented as prefiding over Faith pledged in contracts; and the oath taken on such occasions was thus conceived, "Medius Fidius," i. e. "It is to Deus Fidius adjunct," So help me Medius Fidius, or Hercules. "Swear to me," says Plautus in one of his comedies, by Medius Fidius.

FAITH, in Philosophy and Theology, that affent which we give to a proposition advanced by another, the truth of which we do not immediately perceive from our own reason or experience; or it is a judgment, or assent of the mind, the motive when of is not any intrinsic evidence, but the authority, or testimony, of some other, who reveals or relates it.

Hence, as there are two kinds of authorities and testimonies, the one of God, and the other of man, faith becomes distinguished into divine and human.

FAITH, Divine, is that founded on the authority of God; or, it is that affent we give to what is revealed by God.

The objects of this faith, therefore, are matters of revelation, which see.

FAITH, Human, is that whereby we believe what is told us by men. The object of this faith is matter of human testimony and evidence. See Evidence and Testimony.

Faith, again, may be distinguished into implicit, and scientific.

FAITH, Implicit, or Blind, is that whereby we give our assent to a proposition advanced by another, of whose knowledge and veracity we have no certain and evident reason, or proof. This is only opinion, under another name.

We may observe here, that the terms implicit faith are used in two different senses. With us Protestants, at least in this country, no more is commonly meant by them than the belief of a doctrine, into the truth of which we have made no inquiry, on the bare authority of some per son or society declaring it to be true. But this pre-supposes some knowledge, or some conception of the doctrine itself. In this acceptance of the term implicit, it merely denotes that, in lieu of evidence, one rests on the judgment of him or them by whom the tenet is affirmed; and no other ignorance is implied but that of the proofs. But the implicit faith, recommended by the schoolmen, is a very different thing, and is confounding thus, if you believe that all the religious principles, whatever they be, which are believed by Jurch particular persons, are true, those persons who hold the principles are explicit believers, but you are an implicit believer of all their principles. Nor is your belief the less efficacious, because you are ignorant of the principles themselves. The transcendent excellency of implicit faith consists in this: that you have it in the highest perfection, when, in regard to its object, you know nothing, and have heard nothing at all. This is as if we should call one an implicit mathematician, who knows not a tittle of mathematics, nor even the definitions and axioms; but is convinced of the knowledge of some other person, who is really, or whom he supposes to be an adept in that science. "To believe implicitly," says Bonaventura, is "to believe in general universally all that holy mother church believes; so as to differ from her in nothing, nor disbelieve any of her articles." It is of no consequence, according to the scholastic doctors, what a man's explicit faith may be; he may be an Arian, a Socinian, an Anthropomorphite, a Polytheist, in short, any thing; he cannot err, whilst he has an implicit faith in the church. Implicit faith has been sometimes ludicrously styled \"fares carboaria,\" from the noted story of one who, examining an ignorant collier on his religious principles, asked him what it was that he believed. He answered, "I believe what the church believes.\" "What then," rejoins the other, "does the church believe?\" He readily replied, "the church believes what I believe." The other disposes, if possible, of bringing him to particulars, refutes his inquiry: "Tell me then, I pray you, what it is which you and the church both believe?\" The only answer the collier could give was, "Why truly, sir, the church and I both believe the same thing?\" this is implicit faith in perfection, and, in the estimation of some celebrated doctors, the sum of necessary and saving knowledge in a Christian. Campbell's Lectures on E. H. Lect. xxiii.

FAITH, Scientific, or seeing, is that by which we give our assent to a proposition advanced by one who can neither deceive, nor be deceived; which may be properly referred to science and knowledge.

Divine faith, ceteris paribus, is stronger than human. When we are fully convinced, that any proposition comes from God, faith becomes assurance, or science; it being an ingredient in our idea of God, that he can neither deceive, nor be deceived; but when there is any doubt, whether the proposition is declared by God, the faith can be no stronger, or weaker, than the reasons on which it is founded; divine faith, therefore, may either be strong, weak, or none at all. Again, the reasons or motives of believing men may be of such weight and force, that being perfectly understood, they may equal a mathematical evidence; and then the human faith is far inferior to the divine; there being, if it were, an equal neccessity of giving our assent on each side.

Hence,
F A I

Hence, it is easily observed, that all our faith or belief has its foundation on reason, which cannot deceive us, if we make a due use of our liberty, and do not acquiesce, till that necessarily compels us.

All our present religious faith is really human, as depending on the secondary testimony of men; of whose veracity, however, we have the strongest proofs. The prophets, or those to whom God immediately revealed his will, believed him, because they knew he could not deceive. We at this day believe them, or rather their writings, for other reasons; viz. the same which oblige us to believe all well-attested histories. (See EVIDENCE.) Besides the two species of faith, human and divine, the Romans make a third, or intermediate kind, called

FAITH, Ecclesiastical, which is the ancient orthodox persons give to certain events decided by the church, and enjoined to be believed by all. As, when the church declares that such a book contains heretical doctrine, &c.

This term, ecclesiastical faith, was first introduced by Mr. Peregrine, to distinguish the faith whereby we believe matters of divine revelation, from that whereby we believe matters of ecclesiastical determination.

FAITH, in Practical Theology, makes the first of the theological virtues, or graces.

Faith in God, in this sense, denotes such a conviction of his being, perfections, character, and government, as produces love, truth, worship, obedience, and regeneration. Faith in Christ, as it has been defined by some, is a mere assent to the Gospel as true; according to others, it signifies such a persuasion that he is the Messiah, and such a desire and expectation of the blessings which he has promised in his Gospel to his sincere disciples, as engage the mind to fix its dependence upon him, and subject itself to him in all the ways of holy obedience; and thus defined it is a very extensive principle, and includes in its nature and inseparable effects the whole of moral virtue. In this sense it has been said, that under the Gospel a man is justified by faith. Faith, likewise, in respect to futurity, is a moral principle, implying such a conviction of the reality and importance of a future state, as is sufficient to regulate the temper and conduct.

A theological writer of considerable reputation, who is of opinion that the New Testament teaches, with the clearest evidence, a double justification, (which see,) or salvation, maintains a distinction of faith, corresponding to his ideas of justification. Accordingly he says, that the faith which gave a right to the first justification, or an admittance into the kingdom of God in this world, was consistent with a man's perishing eternally: because he might be admitted into the church upon a profession of that faith, and yet remain a wicked person, and be lost for ever. This was evidently the case with Simon the sorcerer, (Acts, viii. 21.) of whom it is said, though "his heart was not right in the sight of God," and he was in the "gall of bitterness, and bond of iniquity," (v. 23.) that "he believed and was baptized," (v. 13.) Consequentially, that faith must be the general faith, which is common to all Christians, good and bad; or faith considered simply and separably from the fruits and effects of it. It was that general profession of faith in Christ Jesus, as the Messiah and Saviour of the world, (which included a profession of repentance, and which indeed ought to have been sincere,) upon which the apostles baptized the first converts. In this sense, "we are all the children of God by faith in Jesus Christ," (Gal. iii. 26.) This faith may be called the first faith. (See 1 Tim. v. 12.) And it is the continued profession of this faith in Christ, which gives us a continued right to a place in the church. For, if

we cast off this first faith, we renounce our profession, we cease to be Christians; or, we no longer belong to the peculiar family of God. Of this first faith St. James speaks, (chap. ii. 14. 26.) and he very justly pronounces it insufficient, being alone, for our final salvation or justification. In order to that, this general and professed faith must grow into a principle in the heart, working by love, overcoming the world, and bringing forth all the fruits of righteousness in this life; otherwise the first faith, and first justification, will come to nothing. This is the working faith, (Gal. v. 6.) faith perfected by works, ( Jam. ii. 23.) the continued faith (Col. ii. 23.) the growing faith (2 Thess. ii. 13. 2 Pet. i. 5. 2 Cor. x. 15. the first faith; or established faith (Col. ii. 5.) the faith which is the faith of all Christians; this latter faith is peculiar to real Christians. The first may be a dead, inactive faith, (Jam. ii. 17. 20. 26.) The other is living and active. The first is a profession; the other, an operative principle. A man may have the first faith, and perish; by the other, we believe to the saving of the soul. (Heb. x. 39.) The first faith may be a foundation without a super structure; the other is faith built upon and improved. (2 Pet. i. 5. 8. Jude. 20.) This distinction of faith seems to be agreeable to the following texts, Rom. i. 17. 1 John, vi. 13; in the latter of which the first and second faith appears to be distinguished. Taylor's Introduction to his Paraphrase, &c. on the Romans.

The distinction above stated will serve to reconcile the declarations of St. Paul and St. James concerning faith and works, which some have pretended are contradictory; or, they may be otherwise reconciled by considering that St. Paul puts faith for the whole of Christianity, in contradistinction to the law of Moses, and the works which he declares to be unnecessary for justification, are the rites and ceremonies of that law. On the other hand, by faith, St. James means a bare assent to the truth of the gospel; and the works which he declares to be necessary for justification are the moral duties enjoined by the gospel, and which are produced by faith. St. Paul, therefore, says, the religion of Christ, if believed and obeyed, is sufficient to justify. St. James says, the bare belief of the religion of Christ, without conformity to its precepts, is not sufficient to justify. These two propositions are perfectly consistent with each other; and the seeming contradiction in the passages themselves arises from the circumstance just mentioned, namely, that the two apostles, in reasoning against different errors, use the same words in different senses. See Bishop Tomlin's Elements of Christian Theology, vol. ii. p. 262.

F A I

ARTICLES. See ARTICLES.

FAITH, Confession of. See CONFESSION.

FAITH and Homage, in the Feudal Law. See FAITHLY.

FAITHFUL, an application which the Mahometans assume to themselves. See Musulman.

FAITHFULNESS, in Ethics, is an agreement between a man's promises and his actions.

FAITIERE, in Natural History, the name of a species of shell-fish, called by many authors, by a much less determinate name, concha imbricata. The French have thus called it, from the word faiteau, which, in the same language, signifies the roof of a house. The shell is of the buccardium, or ox heart-kind, and has seven longitudinal ribs, and a great many laminæ running transversely across them, so that it greatly resembles the roof of a house, where the rafters and crofs-beams are seen while it is not covered with tiles.

FAITOURS is used in flat. 7 Ric. II. cap. 5. for evildoers; and may be interpreted idle livers, from (says the author
author of the Terms de Ley) faitardje, which signifies a
town of Atascic Turkey, in
Caramania; 4 miles N. of Cogni.
FAK, or FAKS, in Geography, one round or cir-
cle of a cable; otherwise called a coil.
FAKENHAM, in Geography, a small market town in
the hundred of Gallow, Norfolk, England, is situated on
the slope of a hill near the river Yare. The buildings are
neat and compact. The church, dedicated to St. Peter,
is a large, commodious structure, consisting of a nave, two
aisles, chancel, porch, and lofty stone tower; the latter has a
time being windows with a large window divided into five
lights, and subdivided by a horizontal mullion and tracery
mouldings. In the church is an octagonal font, richly
ornamented on every side with religious emblems. The
quarter-fellows for this part of the county were formerly
held alternately here and at Wellingham; but since the turn
has been removed hence to Holt, the fellows-houses has been
used as a school. The sheriff's open court for the whole
county is still held on an adjoining hill. Fakenham is 108
miles distant from London; contains 537 houses, and 2146
inhabitants; has two annual fairs, and a weekly market on
Thursday, which is reckoned the best for corn in the county,
and is regularly attended by the merchants from Wells and
other contiguous ports. Blomefield's Topographical His-
tory of Norfolk.

FAKIR, or FAKS, a kind of dervise, or Mahometan
reliugions, who travels the country, and lives on alms.
The word fakir is Arabic, and signifies a poor or needy
person. It is formed of the word 5پد. fakirs, to be in
need.

D'Herbelot makes fakir and dervise the same thing.
The Turks and Persians use the name dervise for any poor
person, whether he be so out of necessity or choice; and the
Arabs apply fakir in the same sense. Whence, in some
Mahometan countries, the religions are called dervises; and
in others, particularly throughout the fates of the Great
Mogul, fakirs.
The fakirs sometimes travel single, and sometimes in
companies of two or three hundred. When they go in
companies, they have a superior, who is distinguished by
his habit. Each fakir bears a horn, which he blows at
his arrival in any place, as also at his departure; and a
kind of scrapper or trowel, to scrape the earth in the place
where he tis, or lies down. When they go together, they
divide their alms equally amongst them; give what is left
every night to the poor; and never refuse any thing
for the 
morrow.
There is also a kind of idolatrous fakirs, who follow much
the same practice. D'Herbelot reckons in the Indies eight
hundred thousand Mahometan fakirs, and twelve hundred
thousand idolatrous ones; to say nothing of divers extraordinary
species of fakirs, particularly pentents, whose mortifi-
cation and penance consist in very odd observances. Some,
re gr. remain night and day, for many years, in certain
uncanny postures. Others never sit or lie down to sleep,
but infatuate themselves by a rope, hung down for that
purpose. Others bury themselves in a ditch, or pit, for nine
or ten days, without eating or drinking. Others keep their
arms lifted up to heaven so long till they cannot let them
down again if they would. Others lay fire on their heads,
and burn the scalp to the very bone. Others roll them-
selves naked on thorns. Tavernier, &c.

In Bengal, where they are very numerous, they are the
refuge of society, and live altogether on the alms bestowed
upon them by the superstition of the people. They go, says
Stavorinus, entirely naked, and are wholly devoid of shame.
On their shoulders they carry a thick cloth, the end of which
is wound round with rags of cloth, of different colours. It
is dangerous to meet them in solitary places, or in the woods;
for they make no scruple of knocking down, and murder-
ing any one that has any thing of value about him. They
shrew their hair, which hangs down their backs, with alms,
and sometimes swallow in alms. They generally take up
their abode in shady places, either in the open air, or in old
ruinous buildings, without any thing to repose upon, or
to cover themselves. The genuine fakirs make vows of pa-
nance; and Stavorinus says, that he saw one of them, who
had imposed upon himself a silence of 12 years.

Another class of fakirs retire into monasteries, live on alms,
and devote themselves to the study of the law, the reading
of the Alcoran, &c. to fit themselves for monks, or doctors.
People of quality sometimes affix the character of fakirs.
The famous Aurungzebe himself, before he ascended the
throne, gave out, that he intended to commence fakir.

FALK, in Geography, a town of Japan, in the island
of Ximo; 15 miles S. of Nagasaki.

FALOEN, a town of Walachia, on the Danube; 11
miles N. E. of Raffolv.

FALACA, a kind of ballismo inflicted on the Christi-
ans captives in Algiers. The fabca is properly a piece
of wood, about five feet long, bored with two holes,
through which the feet of the patient are put, who is laid
on his back on the ground, with his arms tied. Two men
are employed to give him fifty or an hundred strokes with a
cudgel, or built's pizzle, on the fokes of his feet. A very
trilling fault often incurs this severe punishment.

FALACER, in Mythology, the name of a Roman deity
recorded by Varro.

FALAISE, in Geography, a town of France, and prin-
cipal place of a district, in the department of Calvados, si-
tuated on the Aaute. The town is divided into two parts,
one containing 8800 inhabitants in 10 communes, and the
other 6000 in 30 communes; on a territorial extent of 8357
kilometres. It has manufactures of ferges, linens, and lace.

This was the native place of William the Conqueror. It
lies 18 miles S. of Caen. N. lat. 48° 55'. W. long. 0° 57'.

—Also, a small town in the department of the Dyle; 16
miles S.E. of Tirlemont.

FALAR KEY, in Geography, a town of Italy, in the Patrimoni;
10 miles N.E. of Sutri.

FALARICA, in Antiquity, a kind of dart or misive
weapon, of singular service to the Sagittines in their con-
test with the Carthaginians. This dart was discharged by the
parties posted in wooden towers, upon the enemy. These
wooden towers were called "falco," from which was de-
river the name of the weapon. Towards the end it had a
square piece of iron, bound about with tow, before with
pitch. The iron head, resembling that of the Roman pilum
or javelin, was three feet long, that it might be capable of
penetrating the strongest armours, and, through it, of doing
effect. As the combustible part of it was set on fire
before it was discharged upon the enemy, and this fire must
have been greatly encreased by the air fanning it in its
motion, it could not fail to do mischief, and to excite terror.
This dart was sometimes discharged out of the habita with
an inconceivable force, and did not only destroy men, but
likewise frequently consumed the wooden towers of the
enemy, at which it was levelled. Liv. lib. xxi. Ann. apud
Feil, in voc. Falarica.

FALARI, FALARI, in Ancient Geography, a town of
Italy,
Italy, in Etruria, E. of Tarquinii, and very near the Tiber. The ancient represetit as a well fortified city. The inhabitants often took up arms against the Romans, but when it was subdued by them, they established a colony in it.

FALASJAM, a country of Africa, W. of Abyphinia.

FALCADE, in the Manexe. A horse makes falcales, when he throws himself upon his haunches two or three times, as in very quick curvets, which is done in forming a stop, and half-stop. A fake, therefore, is the action of the haunches, and of the legs, which bend very low, as in curvettes, when you make a stop or half-stop.

They say, this horse stops well, for he makes two or three falcales, and finishes his stop with a pelate. This horse has no haunches, he will make no falcales. The falcales are so much the prettier, as in making them his haunches are low. Stop your horse upon the haunches, in making him ply them well, so that after forming his falcales, he may refuse his gallop without making a pelate, that is, without stopping or making one time. And thus will he make an half-stop. See Haunches and Time.

FALCANDUS, Hugh, in Biogrophy, a Sicilian historian of the 12th century, was supposed to have been a Norman by birth. He published his history about 1192, of which the subject is the expost is the Normans in Sicily, and the calamities which it underwent from 1154 to 1169, under the two kings William I. and II. This work has been several times printed. Moreri.

FALCATA, in our Old Writers, was used for the grafs of the mowed, and laid in thewthes.

FALCATED, one of the phases of the planets, popularly called horrid.

The astronomers say, the moon or any planet is falolated, when the enlightened part appears in form of a tickle, or reaping-hook, by the Latins called false.

The moon is falolated whilst she moves from the third quarter to the conjunction, and from the conjunction, or from new moon, to the full quarter; from hence to opposition or full, and from full to the third quarter the enlightened part appears gibbous, and the dark falolated. See Moon.

FALCATOR, in our Old Writers, the servile tenant who performed service of falcature.

FALCATURE, Falcature, A species one day's mowing of grass; a customary service to the lord by his inferior tenants. Kenet's Gloss, in voc.

FALCKENBERG, in Geography, a town of the duchy of Holstein; seven miles W.S.W. of Nordtrop.

FALCKENBURG, a town of France, in the department of Mont Tourne; 20 miles E.S.E. of Deux Ponts.

FALCO, in Ornithology, a genus of Accipriter, the bill of which is hooked, and furnished at the base with a cere; head closely covered with feathers; tongue bident at the rod.

The falcons are distinguished from the vultures in several essential respects, notwithstanding the similarity in their general appearance and manners of life. The bill in the vulture is of a more lengthened form, or straight, being only hooked at the apex; in the falcon the curve of the bill commences nearly at the base; the head of the vulture is also bare of feathers, and the neck retracible; they differ besides in other particulars, but the two tribes may be clearly ascertained by the above characters. The falcons are generally dispersed throughout the globe, being inhabitants of almost every climate, while the vulture is confined to the warmer regions. Both prey on smaller birds, quadrupeds, reptiles, and some species on fish; these the vultume seems to prefer in a putrid state, as it is rarely known to attack living animals unless urgently pressed by hunger; but the falcon, on the contrary, rejects its food in this state, delighting to seize its prey alive, and devour it recent. The falcon, like the vulture, is capable of enduring abstinence for a considerable period without experiencing any material inconvenience. It has been observed of the falcon tribe that they associate only in the breeding season, and then only in pairs for the purpose of perpetuating their offspring; their nest is sometimes formed of a few twigs and herbage on the bare ground; most commonly, however, they seek some convenient spot on the summits of rocks or hills, and the larger kinds the loftier pinnacles of mountains.

A considerable variation prevails with regard to the colors as well as markings of the plumage in the falcon tribe at different periods of their growth, and hence writers who have treated on this family have been occasionally misled, and induced to describe as distinct species what are in reality no other than the same bird in different transitions of plumage. Some material errors of this kind have already been detected, and others of a similar nature will, no doubt, be discovered likewise, as we become better acquainted with the history of this tribe than we are at present. The falcon genus, in point of species, is very numerous.

Species.


Size rather exceeding that of the turkey; the plumage above mixed with black; the head is covered with feathers, and adorned with a crest of four feathers, two placed on each side; the middle ones are two inches long; those at the sides rather shorter, and the whole are moveable at the will of the bird. The hind part of the neck is fulvous; body beneath white; tail falcated with brown and black; vent and thighs with black and white; the legs are covered with white feathers, and spotted with black. Linnaeus describes the legs in his species harpyja as being naked. This creature inhabits South America, and is said to possess such amazing dexterity that it is able to cleave a man's skull at one stroke of the bill.


Native of the mountains of New Granada; in size nearly resembling the forming. The back, wings, greater part of the neck, and bill, black; head reddish athen, with a crested tuft of long feathers, which fland erect when the bird is irritated; tail long, whitish, with transverse black bands; feet and toes yellow; claws black.


Found in Europe and the southern parts of Russia; the size is equal to that of the turkey, and its food consists chiefly of fish and small birds.


Inhabits Guinea. The body is brown above, with the edge of each feather pale brown; beneath white, with round black spots; breast rufous; the sides falcated with black; tail deep grey, transversely banded with black; toes bright orange. The feathers on the top of the head, and forming a crest.

The length of this bird is three feet; breadth, when the wings are expanded, seven feet; the bill is blue; the cere and legs yellow; the head and neck bright rufous colour; body and tail dark brown. It delights in mountainous situations, and occurs throughout Europe and Siberia. The golden eagle is a bird of prodigious strength and courage, and preys on all the smaller tribe of animals and birds, and is sometimes known to carry off the lambs from the flocks of shepherds in the mountain pastures; it flies to an amazing height in ferene weather.

OSSIFRAGUS. Cere and legs yellow; legs somewhat downy; body ferruginous; tail-feathers white on the inner side. Linnaeus. Aquila ossifraga, Buff. Sea eagle, Will.

Size of a large turkey, and inhabits Europe and North America; this bird lives chiefly on fish.

LEUCOGASTER. White; back, wings, and tail dull brown; tip of the tail white; bill and legs yellow. Gmelin. White bellied eagle, Lath.

Inhabits North America. The length is two feet nine inches; the bill brownish yellow, large, and much hooked; the head, neck, breast, belly, thighs, and vent white; back, wings, and tail dark brown; legs yellow, and very stout; claws black. Described from a specimen formerly in the Leverian museum. Native place supposed to be the islands in the South seas.

JAPONESIS. Cere dusky; legs yellow; body brown. Gmelin. Japanse hawks, Lath.

Described from a specimen in the Bankian collection, measuring one foot eleven inches; the bill is narrow, at the base blue, tip black, and beneath yellowish; the forehead buff colour; the rest of the head and body brown, with the tips rufous; throat white, streaked with black, and surrounded with a black ring; feathers of the breast and belly yellowish-white at the edges; quills dark, and on the inner web of each several ferruginous spots placed transversely; tail deep brown, and all the feathers spotted each side of the webs with ferruginous, except the two outermost, which are plain on the outer web; claws rather large, hooked, and black.


Was found abundant, according to Gmelin, near the city of Atcathan, in the winter of 1769. The length is about two feet, and its disposition highly fierce and rapacious, as it would not feed on the carcasses of dead animals. The bill is lead colour; eye-lids blue; the head and neck ferruginous mixed with white; quill-feathers twenty-six in number, black, beneath white; tail-feathers twelve, equal, and beneath white; legs white, thick, and rough, and claws crooked.

SINENSIS. Cere and legs yellow; body above red-brown, beneath yellowish. Gmelin. Chinae eagle, Lath.

Native of China, and other parts of Asia. In size corresponding nearly with the common eagle; across the wing a dusky band; two bands and tip of the tail dusky.

AMERICANUS. Cere, and woolly legs pale yellow; head, neck, and breast dusky-cinereous; transverse band on the cheeks, back, belly, wings, and tail black. Gmelin. Black checked eagle, Art. Zool.

Size of the common eagle; inhabits North America.

CHEELEA. Somewhat crested, and fuscous; body brown; wing-coverts spotted with white; rump white; tail with a broad white band. Lath. Cheela falcon.

Length exceeding two feet; the species inhabits India, where it is not uncommon, and is known by the name of Cheela.

ASIATICUS. Legs yellow, half downy; body brown above, white beneath; breast streaked; tail-feathers silver grey; external ones with five pale bands. Lath. Asiatic falcon.

Native of China; size that of the honey-buzzard. The bill is black; quill-feathers grey with black bands; upper tail-coverts white; legs downy on the fore part.

NOVA HOLLANDIÆ. White; cere, orbits, and legs pale yellow; hind claw twice as long as either of the rest. Falco Nova Hollanidis, Gmel. New Holland white eagle, Lath.

Described on the authority of Dr. G. R. Forster. The species inhabits New Holland, is twenty inches in length, and has the bill and claws black.

AUSTRALIS. Deep brown; cere yellow; tail black with the tip yellowish. Gmelin. Stantonland eagle, Lath.

Length twenty-five inches; the species inhabits Staten Land, and has a peculiar note, resembling the cry of the common hen.

GEOCOPUS. Cere and legs citron yellow; legs somewhat downy; back and breast brown; head and crown yellowish-white with brown stripes; quill-feathers black. Gmelin.

Found among the mountains of Germany; its length one foot nine inches. The bill is glansous; nostrils large, oval, and behet with bristles; front with brown lunate marks; legs short, and covered with soft feathers.

MELANONOTUS. Cere, and woolly legs pale yellow; head, hind part of the neck, belly, and wing-coverts ferrugious; throat, breast, back, and quill-feathers black. Lath. Ind. Orn. Falco niger, Gmel. Black backed eagle, Brown.

Size of the golden eagle; bill and claws black; base of the tail to the middle white; the extreme part black; claws black. Native place unknown.

LEUCORYPHUS. Cere livid cinereous; legs pale white, slightly downy; body cloudy brown; crown with a triangular white spot; throat white. Gmelin. Aquila leucorypha, Pall. White crowned eagle, Lath.

Frequents the southern parts of Siberia. This bird is larger than the foregoing, and in several respects resembles it; the wings are dusky black, within white; tail long, stiff, equal; claws very large and black.

THARUS. Cere and legs pale yellow; body of the male whitish with black spots; female grey; crown crested. Falco tharius, Gmel. Chiepe eagle.

Described by Muller as an extremely common species in Chili, where it builds in the highest trees, forming its nest of twigs, wool, hair, and feathers; and lays five eggs.

This bird feeds on carrion, poultry, &c. The female is rather smaller than the male.

MOGLINIIK. Cere pale yellow; legs woolly, and with the rest of the body dusky ferruginous; back mixed with white. Aquila moglinii, Gmel. Nov. Comm. Petrop. Ryfian eagle.

Inhabits the deserts near Tanais; the bill, pupil, claws, and quill-feathers black; tail equal; tail-feathers black, with dusky grey bands; tawny at the tips.

CRISTATUS. Head crested; back, throat, and wing's black; belly white; tail with four parallel cinereous bands. Gmelin. Crested falcon, Dillou. Caracca falcon, Lath.

Size
FALCO.

Size of a turkey; upper mandible much hooked, lower straight.

HALIETUS. Cere and legs blue; body abovefuscous, beneath white; head whitish. Gmel.

LEVRIERUS. Legs yellow; headfuscous and white in alternate lines; body abovefuscous, beneath white; wings dull brown. Gmel. *Levrierus falcon*, Arch. Zool.

Native of Carolina; size of the buzzard.

LAGOPUS. Cere and tawny legs yellow; body black, spotted with white; tail-feathers white, towards the tip black. Gmel. *Gazza-lagopus*, Avic. Nid. Rough-legged falcon.

This rare species inhabits Europe, and has been observed in Britain; a specimen shot near London occurs in the collection of Mr. Donovan.


By some writers this bird is considered as a variety of the former; the crown is brown with irregular oblong spots of white; front whitish; cheeks blackish; tail above dusky, croushed with paler bars, beneath whitish.


Native of the West Indies. The species feeds on smaller birds, snakes, and other reptiles; and is about eighteen inches in length.

PENNATUS. Cere and legs yellow; body above variegated with blackish brown and dirty grey, beneath brown yellow, with longitudinal blackish lines; feet feathered to the toes. Gmel. *Falco pedatus pennatis*, Briff. Booted falcon.

Length about twenty inches; the bill blackish; head and neck yellow-grey with blackish lines; tail brown, towards the tip blackish, with the apex grey; claws black. Decribed by Briffon from a specimen in the museum of Madame de Bandeville; its native place unknown.

MARITIMUS. Cere and legs yellow; body and tip of the tail white; tansks reddish mixed with white. Gmel. *Javan eagle*.

A large species, measuring in length near four feet; it lives on the sea coast of Java, and feeds on fish and carriion.

ÆGYPTIUS. Cere yellow; legs half downy and yellow; body above cinereous, beneath ferruginous; wings above brown; tail forked, as long as the body, and barred with brown. Gmel. *Falco cinereo-ferruginos*, Forlkal. Arabiam Kite, Lath.

Frequent in Egypt. Length eighteen inches; bill yellow; tail-feathers black towards the tip; wings beneath grey-brown; tail cinereous; claws black.

NIOLETICUS. Cere and legs yellow; body above reddish brown with transverse black rays; tail forked, as long as the body; wings variegated with brown, grey, white and reddish. Somm. *Niolet falkon*.

Length twelve inches; the bill black, at the base grey; feathers of the head black in the middle, of the sides of the head varied with black, grey, and red; throat grey; upper part of the breast reddish with black longitudinal spots; rest of the body beneath grey, tinged with red; legs spotted with black.


The kite is common in most of the hilly parts of Britain, and is found in Sweden, Germany, and other parts of Europe, and also in Asia and Africa, but upon the least authorities appears to be unknown as an inhabitant of the American continent. In England it remains throughout the year, as it approaches the more northern climates it becomes migratory, palling the winter in milder climates. The kite is a bird of large dimensions, in length exceeding two feet. The smaller kinds of birds, and other animal of inferior size, are its usual prey; and poultry especially, in quell of which it is often seen hovering on the wings over farm-yards in the country ready to dart down upon the struggling young and carry them away. The egg of the kite is blueish white, inclining to red at one end.

In the left edition of the Systema Naturæ three supposed varieties of this species are enumerated, as 3 mitius vertice et gula caitaneis, Gmel. having the head and throat chestnut; γ acceptor korshum, S. G. Gmel. found in the deserts at Tana in the Ruffian dominions; the bill of which is blueish black; κ greenish; æ of the eyes white; sides of the head pale brown; head and throat chestnut. Two mitius jucundus, Lepeschin, with the coverts of the back violet; feathers marked at the top with a white spot.


Smaller than the common kite, and inhabits Europe.

AUSTRIACUS. Cere and legs yellow; legs somewhat downy; body above chestnut, beneath brick, colour spotted with brown; tail forked. Gmel. *Brauner-geyer*, Kran. *Austrian kite*.

Inhabits the woods of Austria, and feeds on small birds and dormice; in point of size resembles the common kite.


Native of Brazil; its size is that of the common kite, and it is exceedingly destructive to poultry. Length nine inches.


An elegant species, and of larger size than the common European kite; it inhabits Carolina in the summer months, where it is called the snake hawk. The principal food of this bird consists of insects.

USURITING. Cere and legs yellow; bodyfuscous and ferruginous varied; wings black mixed with cinereous; tail white, the tip black speckled with white. Gmel. *Usuriting*, Ray. *Brazilian eagle*.

Briffon describes this as being about the size of a half grown duck, and as a native of Brazil.

ÆQUINOCTIALIS. Legs pale yellow; head, neck, and back black-brown; breast reddish; wing coverts and shoulders chocolate; tail black; the feathers, except the two middle ones, marked with the letter V in white.

Gmel. *Equinoctial eagle*.

Native of Ceylon; length twenty-one inches; bill pale; claws pale, with the tip black.

ORIENTALIS. Legs head-colour; bodyfuscous; eye-brows ferruginous; wings and tail spotted with whit. Gmel. *Oriental hawk*, Lath.

Length fourteen inches; the bill is black, beneath yellow.
low; body beneath sub-ferruginous; the species inhabits Japan.

**Indicus.** Cere and legs yellow; body reddish fusceous; front and rump white; belly streaked with whitish; tail brown, with five black bands. *Falco indicus,* Gmel. *Javan hawk.*

Size of the feet; bill black, base yellow; hind head whitish.

**Ponticerianus.** Cere blueish; body chestnut; head, neck, and breast white, with a longitudinal brown line in the middle of all the feathers. *Aquila ponticeriana,* Br. *Aigle de Penderych,* Buff. *Penderrych eagle.*

About the size of the jer-falcon, the length one foot seven inches. The species is held feared among the natives on the coast of Malabar, where it inhabits.


The buzzard is a native of Europe and preys on small birds, reptiles, the inferior tribes of quadrupeds, and insects; its length is twenty inches. Not uncommon in Britain.


Inhabits Europe, and preys on mice, lizards, frogs, small birds, and insects, especially bees, whence its name; the male birds are very uncommon, the female extremely rare. The length of this species is one foot eleven inches.


Length twelve inches; the bill dusky with black claws. This species inhabits North America.

**Jamaicensis.** Cere and legs pale yellow; body above brownish yellow varied with fusceous. *Gmel. Jamaica buzzard,* Lath.

Inhabits Jamaica; the size of the common buzzard, and rare.

**Borealis.** Cere and legs pale yellow; body above brown, beneath white; tail pale rufus, with a transverse rufous band near the tip. *Gmel.* *Red tailed falcon,* Arct. Zool.

Size of the feet, and inhabits North America.


Native of France and Germany.


Length twenty-one inches; the species inhabits Europe, where it frequents marshy places, and subsists principally on fish, aquatic birds, and rabbits. Some variation is observable in the plumage of different individuals of this species.

**Sclavonicus.** Cere yellow; legs downy; body bristle-colour, spotted with black; head and neck whitish. *Kram.* *Sclavonian buzzard.*

Native of Sclavonia; its size that of the common cock.

**Marginatus.** Cere blueish; body above variegated brown and rufous, beneath rufous, with irregular oval brown spots; tail-feathers barred with blackish, edged with white. *Falco marginatus,* lt. *Pofegan.* *Creation buzzard.*

Rather less than the former, and also inhabits Sclavonia and Croatia.

**Rubiginosus.** Fusceous; beneath whitish-yellow; breast with a yellow spot; tail-feathers with four dull red bars. *It. Pofegan.*

Bill black; head whitish yellow; wing-coverts white at the tip; legs pale yellow. The species inhabits Sclavonia.

**Javanicus.** Cere black, in the middle yellow; legs yellow; head, neck, and breast chestnut; back brown. *Wurmb.*

Inhabits the maritime parts of Java, and feeds on fish.

**Spadiceus.** Cere yellow; body chocolate mixed with rufous; beneath white at the sides; legs feathered to the toes. *Falco spadiceus,* Phil. *Trans.* *Bay falcon,* Lath.

This and the Placentia falcon (Lath.) are supposed to be varieties of the same species. The first is from Hudson's bay, the other from Newfoundland. The Bay falcon preys on ducks, which they seize as they rise out of the water; its length is twenty-two inches.

**Oboletus.** Legs yellow, body brown; beneath slightly spotted with white; tail-feathers in the middle pale brown. *Gmel.* *Plain falcon.*

Length two feet; bill black, nape spotted with white; native of Hudson's bay.

**Novae Zelandiae.** Cere and legs yellow; body ferruginous brown; beneath flecked with rufous; tail fuscous with pale yellow; thighs ferruginous. *Lath.*

**New Zealand falcon.**

The female measures twenty-three inches in length, the male eighteen. Its bill is blue, as are also the naked orbits of the eye; in the female the orbits are blue.

**Lineatus.** Cere and legs yellow; body ferruginous brown, varied with white and pale-rufous lines; tail-feathers dusky brown, with two transverse dirty white bands and tips. *Gmel.* *Red shouldered falcon,* Arct. Zool. *Barred-shouldered buzzard,* Lath.

Native of New North America; size that of the common buzzard.

**Rusticolus.** Cere, eye-lids, and legs yellow; body waved with cincereous and white; collar white. *Linn.* *Collared falcon.*

Inhabits Sweden, and, according to *Linnaeus,* is the size of the common hen.

**Macarius.** Cere and legs pale yellow; bill blackish; body above cincereous, beneath white; inner parts of the wings cincereous, tips white. *Lepeschin,* &c. *Long-tailed falcon.*

The length of this bird is nineteen inches; tail nearly nine inches; it inhabits Russia, and is known by the name of Lur.

**Cayennensis.** Legs blue; head and neck blueish-white; back and wings dusky ash, throat, breast, and belly whitish. *Gmel.* *Petit auteur de Cayenne,* Buff. *Cayenne falcon.*

Native of Cayenne; the bill is blue; irides yellow.


Formerly used in falconry, and highly esteemed for that purpose; the species is twenty-two inches in length; the bill blue with the tip black; irides yellow; head brown; body beneath white, waved with black; tail long, cincereous, white at the tip, and claws bluish. The goshawk is fierce in England, in Scotland not uncommon, and is there considered very destructive to game. The species inhabits various parts of Europe, and extends to Asia and America.

**Gentilis.**
FALCO.

**GENTILIS.** Cere and legs yellow; body cinereous with brown spots; tail with four blackish bands. Linn. Falco montanus, Ray. *Falco gentilis*, Will. &c.

Inhabits the mountains of Europe and North America, and occurs rarely in England; the size exceeds that of the goshawk, and the species preys on partridges. The bill is lead-colour; irids yellow; head reddish with oblong black spots; tail dotted with white; claws black.


The common falcon is about the size of a moderate fowl, and nearly eighteen inches in length. Whether this be the primitive flock from whence the following supposed varieties, enumerated by falconers, have originated, we cannot pretend to determine; and shall only observe that it is admitted as such by writers of repute.

**Varieties.**


*So named when grown old, from drawing its head close between the shoulders, as though it were hump-backed.*


In this variety the bill is ash-coloured; cere pale yellow; back and wing-covers spotted with brown, rufous, grey, and whitish indifferently; beneath grey with brown spots, each spot encircling with rufous; feet feathered to the toes; legs yellow; claws black. There is another variety in which the head, neck, and breast are white, with minutefuscous spots only.


Several varieties of this kind are described; in some the back and wings are marked with a few black spots, and the tail barred; others have the white plumage marked with scarcely visible yellow spots.


*Buffon admits this to be a distinct species, and names it le Faucon Paffager.*

*Navicus*. Wings spotted. Brill.


*Italianus*. Breast pale yellow with ferruginous spots; wings near the tip spotted with white. Brill. *Italian falcon.*

*Found in the Alps.*

The varieties above-mentioned are widely dispersed throughout Europe, and North America, China, and other parts of Asia.

*Gyrfalcio. Cere blue, legs yellow; body fulvous; beneath fuscated with cinereous; tail at the sides white. Linn. *Jer-falcon.*

Inhabits Europe.

**Islandicus.** White, with fulvous spots; tail-feathers white; outer edges spotted with brown. Lath.

Native of Iceland.

**Peregrinus.** Cere and legs pale yellow; body above blue, cinereous, striped with brown; beneath reddish-white, with blackish stripes; tail dotted with white. Gmel. *Peregrinus falco*, Donov. Brit. Birds, &c.

Bred in the mountainous parts of Britain, and was formerly employed in the sports of falconry. The species is found in various parts of Europe, Asia, and America.

*Versicolor*. Cere yellow; head and body above white, with pale reddish spots, beneath white; breast a little spotted with ferruginous. Gmel. *Spotted falcon.*

Three distinct species of the falco tribe have been described by different English writers, under the name of the spotted falcon. The first bird to which this name was affixed is smaller than the other two, and differs considerably in plumage; the second is the spotted falcon of Pennant; and the third the spotted falcon of Lewin and Walcot.

The errors of the latter-mentioned writers have originated from misconceiving the specimen first described by the title of the spotted falcon, and which for this reason ought with propriety to be considered as the original. Each of the individual specimens described by these respective writers were preferred in the late Leverian museum, and are at present in the possession of Mr. Donovan.

**Barbatus.** Cere and legs pale yellow; body blueish, with fulvous spots; breast immaculate; tail fuscated. Linn. *Falco tunctus*, Ray. *Barbary falcon*, Will. *Length one foot five inches; the species inhabits Barbary.*

**Sohnannis.** Cere and feathered legs yellow; body brown; above with black and dirty white oblique lines; beneath white and yellowish spots; tail barred, and white at the tip. Gmel. *St. John's falcon*, Artz. Zool.

Native of Newfoundland.

**Sacer.** Cere and legs blue; back, breast, and primary wing-covers spotted with brown; tail with kidney-shaped spots. Brill. *Sacer*, Buff.

A large species measuring in length two feet; it inhabits Europe, and extends to Tartary. The speckled partridge-hawk of the Arctic Zoology is supposed to be a variety of this bird.

**Nov. Terra.** Cere and legs yellow; body above brown, beneath and hind head ferruginous; tail variegated with paler and darker lines. Gmel. *Newfoundland falcon.* *Length twenty inches; legs half-feathered; the species inhabits Newfoundland.*


Native of Europe. *Size of the peregrine falcon; wings shorter; tail longer; irids golden.*


Inhabits New York during the winter season. *Length eighteen inches; in the male the wing-covers are dull, edged with dull white, the exterior one orange; in the female brown and black bars, and white at the tip; bill black; feet long and slender.*

**Rhomburus.** Legs yellowish; body above grey, beneath brown, with rhombic spots; tail-feathers with eleven oblique black bands. Lath. *Rhomboidal falcon.*

The length of this bird is nineteen inches; the bill is lead colour;
The E. cirrhatus, Falco rufus, with black bands; tail-feathers blackish at the tips. Lath. Black-necked falcon, Lath.

C. leucurus, Buff. L. It has five inches long.

Bill black, and a black streak behind the eye.

A. leucurus, Linn. The legs are black, having four claws.

Native of Ceylon; its length is fifteen inches; bill black, and a black streak behind the eye.

The E. cirrhatus, Falco rufus, with black bands; tail-feathers blackish at the tips. Lath. Black-necked falcon, Lath.

Length twenty-two inches; quill-feathers spotted with white from the base to the middle. Inhabits Cayenne.


Described by Somerat as a native of Ceylon, under the title of faunus à collier des Indes. The length is fifteen inches; its rufous; oribits spotted with white; bill, claws, and middle wing-coverts blackish.

C. cirrhatus. Cere and feathered legs pale yellow; bill crested on the hind head pedunculous; body above black; breast inclined black and white. Lath. Falco cirrhatus, Br. C. cirrhatus, Ray. Faunus baj in Inde, Buff. Crested Indian falcon, Will.

Size of the goshawk; the bill dark blue; irides yellow; neck sauce; curls with cinereous and black bands placed transversely; claws black. A furred variety, has a black band across the breast, and another on the wing.

Meridionalis. Core and chin yellow; head and neck rufous, with dark streaks; belly white, with narrow black bars; four middle tail-feathers with one, the outer with five pale bars. Lath. Rufous-headed falcon.

Length nineteen inches; the species inhabits Ceyenne.

Melanops. Cere and legs pale yellow; body black, with white spots; beneath white; head and neck white, with black flanks; orbits black; quill-feathers black, with a white band in the middle. Lath. Streaked falcon.

Size of a rook, and inhabits Ceyenne.

Cachinnans. Cere and legs pale yellow; eye-brows white; body varied with brown and whitish; crown white, with a black ring. Linn. Laughing falcon, Lath. Inhabits South America, and emits a laughing sound when observed. The back, wings, and rump are brown; neck, chin, breast, and belly, with the under parts of the wings white; tail with yellow and black bands.

Supinator. Cere and legs pale yellow; body whitish-brown; eye-brows brown. Lim. Saricina falcon, Lath. Native of Sariban.

Bidentatus. Bill bidentate and fulvous; body lead colour; breast and abdomen rufous; vent white; quill-feathers with many, tail with three bars of white. Lath. Notch-d. falcon.

Native of Ceyenne; length fourteen inches.


The length of this beautiful species is eighteen inches. The bill is blue and straight at the base; irides orange; legs yellow; claws black. Inhabits Ceyenne and South America. The female is five inches longer than the male, the body blacker, purple on the neck more obscure, and the polier part of the thighs with the vent white.

Albicran. Cere and legs pale yellow; body brownish, beneath white; quill and tail-feathers blackish. Gmel. White raven.

Inhabits Europe, and is by some believed to be the same with the common raven.


Rather less than the buzzard, and inhabits Europe; very rare in Britain.


The above are the two forms of the same species; the male is of nineteen inches in length, the female nineteen inches and a half; the species is found in Europe and Siberia.

Himantopus. Cere and legs yellow; back brown; eyebrows white; spiculum on the wing blackish. Linn. Ring-tailed hawk, Buff. Whistled ray-tail, Lath.

Length three feet nine inches and a half; the bill black; body beneath white, with rufous-brown spots. The Plodon's beautiful tail-feathers of Latinum is imparted by that writer, in Lath. Orn. To be the same with the above, and both, together with the following, are imagined to be varieties of ceyanes.

Bubo. Cere blue; legs yellow; body blackish; chin: beneath rufous-buff; eye-brows yellow; tail with pale and dusky brown spots. Gmel. Ceyenne ring-tail, Lath.

Inhabits Ceyenne.

Unguis. Cere and legs orange, body above brown, beneath shining rusty; tail with four black bands. Gmel. Macus hawk.

Brodie considers this as a variety of falco cyanus, and in this opinion he is counteracted by some other writers; it differs principally in being larger, and in having a black streak through the eye, independently of the above-mentioned characters. The Marsh hawk is represented as a fierce bird, and inhabits Jamaica.

Calidus. Legs yellow; body brown-black, beneath white, with black lunettes; tail with oblong bars. Lath. Before falcon.

This species inhabits India, and is called Behree; its length is nineteen inches.

Nitis. Lead colour; beneath white, with cinereous bands; tail-feathers blackish, with two narrow transverse white lines. Gmel. Plumbeus fol. n.

Native of Ceyenne; length thirteen inches and a half; legs yellow.


The male is fourteen inches in length, the female much larger; the former has the head and tail grey, and the back and wings purplish red, with black spots; in the female the head is reddish with black streaks; back, tail, and wing-coverts rufous with black lines. The species was formerly employed in the spouts of falconry for young partridges, and small birds. The hawk, called Peperier des alouettes.
ALCO.

Badius. Legs: pale, head and body above brown, beneath white, with yellow lunar spots; tail pale brown, with four dusky lines. Falco badius, Gmel. Brown hawk, Brown fluker.

Inhabits Ceylon; length thirteen inches; bill blue, iris yellow.

Dubiuss. Cere, irides, and legs yellow; body fuscos; beneath white, fringed with fuscos; tail-feathers cinereous, with four black bands. Gmel. Dibius falcon, Lath.

Length ten inches, and inhabits Carolina.

Obscuris. Cere and legs yellow; bind head and neck spotted with white; body above fuscos; beneath whitish lineated with black; tail with fuscos bands. Filectolceus, Gmel. Dusky falcon, Arch. Zool.

Smaller than the last, and inhabits New York. The bill is blue; head dull fuscos; tail short; legs with the tip white.

Columbarius. Cere, irides, and legs pale yellow; body fuscos; beneath white, fringed with fuscos; tail with four narrow black bands. Linn, Acipiter carolinensis, Briss. Ebervier des pigeons, Buff. Pigeon hawk, Cateby.

Length ten inches; the bill whitish, with black tip; legs yellow, and cloaca black; the species is a native of Carolina, and other parts of North America, and is called the small black hawk by the inhabitants of Hudson's bay. It feeds on small birds, and shrinks hideously.


Frequent among the rice plantations on the coast of Carolina, where it is supposed to prey on the frogs which abound in those places; when disturbed, it utters a loud cry, and has hence obtained the name of criard. Its size is that of a pigeon; the irides are yellow; and the orbes red and naked.

Supersilicous. Cere and eye-lids pale yellow; body fuscos, with whitish waves; quill-feathers rufous, with black bands. Linn. Guiana falcon, Lath.

Size of the magpie, and inhabits Surinam and Guiana. The secondary tail-feathers are whitish at the outer edge; the tail black, with two broad bands, and cinereous tip; vent white, with a few black streaks; bill and claws black.


Native of Ingrisa, Rossia, and Siberia; on the banks of the Baikal very common, and known by the names of koper and derbutitchock; it flies chiefly in the evening or night time, and feeds on quails, small birds, reptiles, &c. The size is that of the pigeon; the body blackish, fuscos; belly bluish white; head fuscos; bill yellow; legs naked. The nest is built on the tops of high trees, and not unfrequently it takes possession of the magpie's nest instead of constructing one for itself.

Vesperetinoides. Cere, legs, and eye-brows pale yellow; thighs black; neck, breast, and belly brownish, with white spots, Falck, &c. Periman falcon.

Inhabits Permia and Bashkirtia, in Siberia; size half that of vipettinus.

Magnirostris. Cere and legs yellow; body fuscos; abdomen white, with ferruginosus flaxis; quill-feathers black and white banded. Gmel. Eberver à gros bec de Cayenne, Buff. Great-billed falcon.

Larger than the sparrow hawk, and inhabits Cayenne.

Johannensis. Legs pale yellow; body ferruginosus, with...
with linear black dots; throat pale yellow; quill-feathers blackish fuscous; tail cuneiform and white. Lath Joanna falcon.

Inhabits the island of Johanna, in India; its size uncertain, the species being described from a manuscript in the possession of the late Dr. Forthgill.


Native of Europe, and extending as far as Siberia. Length twelve inches; the bill blue; orbits yellow; lateral tail-feathers with blackish bars; claws black. Preys on larks, and other small birds. A variety of this bird has the body above blueish black; cheeks white with a black line reaching through them from the crown.

LITHOFALCO. Cere yellow; body cinereous fuscous; beneath reddish with longitudinal fuscous streaks; tail-feathers blackish toward the tips, and at the extremity white. Falco lithofalco, Ray. Le rocher, Buff. Stone falcon. Will.

Size of the kestrel, and inhabits Europe; bill lead-colour, irides yellow.

MONTANUS. Legs pale yellow; body cinereous brown, beneath whitish; head black; throat spotted; tail at the base cinereous, in the middle blackish, at the tip white. Gmel. Falco montanus, Ray. Mountain falcon, Will.

Briffon describes this bird as being less than the peregrine falcon, and as a probable variety of the stone falcon; the “faucon de montagne cendré” of the same writer is conceived to be another variety; the latter is twenty-one inches in length; the bill is black; iris yellow; general colour cinereous; palest on the wing-coverts; beneath white; legs luteous.

AVRANTUS. Bill and legs lead colour; body blackish; back, bafe, and tail with white interrupted bands; breast fuscous; thighs ferruginous. Lath. Orange-breasted hobby.

Native of Surinam, and in length fifteen inches. The bill is whitish at the base; throat with round white spots; lower tail-coverts rufous; legs long and slender; claws black. There is a variety in which the body is more dusky; the chin white, and throat orange; this is two-thirds the size of the former. Another of the same magnitude as the latter small variety has the legs tawny; body above blueish-black with blueish streaks, and streaked beneath with white.

PLUMBEUS. Cere dusky; legs yellow; body cinereous; upper part of the back black-lead colour; tail feathers underneath with three white spots. Lath. Spotted-tail hobby.

Size of the sparrow hawk; bill and claws black; head and neck cinereous; legs short. Native of Cayenne.


The Merlin inhabits various countries in Europe, and the southern part of Asia, but appears to be every where rather uncommon. The species is of a small size, being scarcely larger than a blackbird; it was nevertheless formerly employed in the sports of falconry, and was not considered inferior in point of spirit to any of the hawk tribe. Merlins have been known to breed, though very rarely, in North Britain; in less temperate regions they migrate southerly at the approach of winter. The bill is blueish; tail marked with alternate dusky and reddish streaks; claws black.

There are several varieties of this species: one kind has the front cinereous; crown, back, and wing-coverts chestnut; temples with a triangular spot of white, edged with black; tail chestnut with black ripes, beneath varied with black and white. The Caribbean variety is rather larger than a thrush; it is rufous above with black spots, beneath white with longitudinal spots of black. Briffon considers this as a variety of the merlin, and names it l'emerillon des Antilles. The natives of the Antilles call it gry gry. The true falconer's merlin, according to Buffon, resembles the hobby in figure, except that the wings are shorter, and in colour and other respects accords with the stone falcon. This, however, seems very doubtful, as Salene observes, for sportsmen have commonly confounded all the birds of the hawk tribe inferior in size to the buzzard, under the name of merlin, and there are, for this reason, several birds which have an equal claim to the same title, as well as the ambiguous variety mentioned by Buffon.

MINUTUS. Cere brown; legs yellow; body beneath white; tail-feathers brown, banded with black. Linn. Accipiter minor, Briff. Minute falcon.

Inhabits the island of Malta; length eleven inches; the bill and claws are black; body above brown, varied with rufous; beneath with transverse brownish red streaks; belly with lanceolate spots.

CERULESCENS. Cere, eye-lids, legs, and body beneath pale yellow; back blueish black; temples surrouned by a white line. Linn. Falco bengalensis, Briff. Little black and orange Indian hawk; Edw. Bengal falcon. Length six inches and a half; inhabits Bengal.

REGULUS. Cere greenish; legs obscure yellow; ruff ferruginous; body above lead colour, beneath whitish with rufous spots. Pallas. Siberian falcon.

I have species discovered by Pallas in Siberia: the irides are brown; crown brown with black lines; wings white at the edges, varying beneath; tail feathers lead-colour towards the tip, beneath with pale bands, edges black, tips white. Less than six inches in length; and preys on larks.

TINUS. Legs yellow; body cinereous fuscous; beneath whitish with blackish bands; crown whitish. Lath. Tiny falcon.

This minute species, formerly in the Leverian museum, is six inches in length, or rather less; the bill dusky; legs yellow. The tail in this specimen wanting.

The Jer-falcon, the gentil falcon, the common falcon, the peregrine, and the gohawk, were the principal species used in the diversion of Falconry, which see.

FALCON, in Gunnery. See FALCON.

FALCON, in Ornithology. See FALCO.

FALCONARA, in Geography, a town of Naples, in Calabria Citera; nine miles W. of Cofenza.

FALCON. Da Benevento, in Biography, an ancient chronicler, filled an high office under pope Innocent II. about the middle of the 12th century. He was afterwards chief magiftrate of Benevento. He wrote a chronicle of the affairs of the kingdom of Naples from 1102 to 1140, which is esteemed a faithful and very useful record. It is found in Muratori's and other historical collections. Moreri.

FALCONER, a person who brings up, tames, and makes, that is, tutors and manages birds of prey; as falcons, hawks, &c. The grand seignior usually keeps six thousand falconers.
falconers in his service. The French king had a grand falconer, which was an office dismembered from that of great hunt, grand venuer. The duke of St. Alban's is hereditary grand falconer of England.

Historians take notice of this post as early as the year 1250. One great business of the falconer is to confider the quality and mettle of the birds, to know which to fly early, and which late. He must also be busy and cleanly in freeing them of lice, nits, and vermin. Every night after flying he should give his bird calling; nor must he forget to water her unless she have been bathed. After this, she must be put in a warm room, having a perch, with a candle burning by her; where she is to sit unhooded, that she may prune and pick herself. Next morning she should be weathered, &c.

FALCONER, William, in Biography, was born in a village in Fifeshire, Scotland, and left, at an early age, an orphan. He was brought up a tailor, and in that capacity he spent the greater part of his life, in a very low station. We do not know how he acquired a taste for literature, but while serving on board a man of war he attracted the notice of Campbell, author of Lexiphanes, who took him for his servant, and became his literary instructor. He published, in 1751, a poem on the death of Frederic, prince of Wales, which was but little noticed, and he was left to struggle with the hardships of his profession. Like many other poets, he seems to have been the sport of ill fortune, for he calls himself "a hapless youth, whose vital page was one sad lengthened tale of woe." He suffered shipwreck in a voyage from Alexandria to Venice, a circumstance that produced a poem to which he is indebted for celebrity: it is entitled "The Shipwreck." He dedicated this little work to Edward, duke of York, by whose interest he obtained the lucrative employment of purver to the Royal George. This poem consists of three cantos: the scene of the first is near the city of Candia, and the time about four days and a half; the scene of the second lies in the sea between Cape Freschia in Candia, and the island of Falconera; the time from nine in the morning till one the following morning; the scene of the third stretches from that part of the Archipelago which lies ten miles to the northward of Falconera to Cape Colonna, in Attica; the time from one till eight in the morning. The verification of this poem is varied and melodious; its description, being drawn from reality, is strong, glowing, and often original. It is, nevertheless, so technical, as sometimes to be too obscure for common readers; but it has the advantage of communicating new ideas, which is no common quality in cultivated verse.

After Mr. Falconer's promotion in the sea-service, he enlisted in the field of satirical controversy, as one of the king's friends, and wrote a satyrical poem, entitled, "The Demagogue," in which Mr. Pitt, Wilkes, Churchill, and the opposition in general, were treated with virulence. In 1769 he published "The Marine Dictionary," a work of considerable merit, and to which many modern Cyclopedias have been indebted. This was his last performance, for in the same year he embarked on board the Aurora, bound to the East Indies, where Falconer proposed to settle. The vessel was never heard of after the left the Cape of Good Hope, and it is supposed she perished with all her crew. Lives of the Poets.

FALCONERA, in Geography, a town of Italy, in the duchy of Mirandola; four miles N.E. of Mirandola. N. lat. 56° 57'. E. long. 24° 1'.—Alfo, a town of Italy, in the department of the Panaro; four miles N. of Mirandola.

FALCONET, in Gunnery. See Falconet.
almost every kind of falcon, from the largest to the smallest, may be trained to falconry; even eagles themselves have here been used for the chase of the roebuck, the antelope, the wolf, fox, &c. Falcons of the larger kind, as the jer-falcon, the peregrine, and the goshawk, were used for the flight after the heron, the wild geese, the crane, the hare, &c.; and the common falcon for game in general; while those of the smaller kind were often instructed to fly at the partridge and the quail. The Iceland falcon, according to Mr. Pennant, in the highest elegance, and will last ten or twelve years (some falcons are said to continue in full vigour for twenty years); whereas those of Norway, and other countries, are seldom fit for the sports of the field after two or three years' use. The feats performed by the jer-falcon may be numbered among the noblest in the practice of falconry. Scaiger affirms, that he faw some which belonged to Henry, king of Navarro, strike down a buzzard, two wild geese, divers kites, a crane, and a swan. Among the best of hawks for falconry is also the goshawk; these were used by the emperor of China in his sporting progresses attended by his grand falconer, and a thousand subordinate persons in his train. The emperor often carried a hawk on his hand, to let fly at any game which might present itself. If, and which were usually pheasants, partridges, cranes, or quails. This diversion was witnessed by Marco Polo in the year 1260. The flight of a strong falcon is wonderfully swift. To this purpose it is recorded that a falcon belonging to a duke of Cleve, flew out of Westphalia into Prussia in one day; and in the county of Norfolk a hawk has made a flight at a woodcock near thirty miles in an hour.

Hawks in general prove courageous or cowardly all their lives, as they are first quarried; and if they are taken out of the eyrie before they are fully summcd and well penned, their wings will never grow to perfection. Their legs also will grow crooked, and their train will be full of taints. Falcons of one and the same kind are called by the sportmen by very different names, and esteemed of several different kinds, according to the places and time of their reclamations, and the countries from whence they came. Thus the names mewed-hawk, ramaged-hawk, foar-hawk, and eyaffe, first commenced; and there are again divided into large hawks, wean hawks, and header hawks. All these have different maims and plumage, according to the country from whence they come; some are black, some brown; they have also each its different disposition, some being bent for the field, and others for the brock or river. Different names are also given to falcons according to their different age and time of taking. The falcon is called an eyaffe, as long as she remains in the eyrie; these are always troublesome in their feeding; they cry very much, and they are not entered without great difficulty; but being once well entered, they prove excellent hawks for the heron and all the large fowl, and are very hardy and full of courage. The second name given this bird is the ramage-falcon. This name she retains from the time of her leaving the eyrie, during the months of June, July, and August. These are always hard to be managed; but being reclaimed, they are not inferior to any hawk. The third is the foar-hawk, so called in September, October, and November. These birds keep for a whole twelvemonth the first feathers, which they have on when they leave the eyrie, and do not molt them. These are therefore called the foar-feathers. The fourth is termed the muzzarolet or carvill, quasi carry-fill; for they may at this time be almost continually carried on the fill. They are thus called from January to the middle of May. These are usually great biters, and very little eaters; they are subject to several troublesome disorders, particularly to the lizards, more than any other hawk, and they are very flemish brought to be good at any thing. The fifth name is the externew. They are called by this name from May till December, because all that time they are calling their cants. These would be excellent hawks if they could be trained; but they are very shy. They must be kept hard under, and the falconer must make his fret their perch. The hawk newly taken must be fed, have all new furniture, and must be often stroked with a stick to accustom her to be gentle. She must also have two good belts, that she may be well heard when the firs or terraces, and her hawk and talons must be cut a little, but not so near as to make them bleed. If there be a fear-falcon taken that has already crossed the seas, she is usually very hard to be broken; but that being well done, she is the best of all hawks. Her food must be good and warm, and it must be given her at half three times a day. It should be pigeons, larks, or other little birds; for the mule be broke by degrees from her accustomation manner of feeding. The hawk mule must always be fed with keep and lure, that she may always know when you will give her meat. She must then be gently unhooded, and two or three bits being given her, the mule be hooded again; and in the night let her remain on a manger near force person's bed, and she may be often waked in the night. When by these means she becomes tame and gentle, her usual food may be changed, and a sheep's heart given her. After this she may be unhooded in the day time, but not in company, and after giving her a bit or two, the mule be hooded again, and then a little more given her. After this, by degrees, she will be taught to eat before company, and then the buskins of taming her will soon be accomplished. Till she is thoroughly mamed, she must be borne continually on the sill, and fed in company, giving her in the morning about fun-fife the wing of a pullet, and every morning the foot of a hare or rabbit cut off above the joint, head, and laid in water, which having squeezed given it her with the pinch of a hen's wing. It is best to given the hawk washed meat, and after this plumage, according as the seems to be foul within. She is then to be hooded, and nothing more should be given her till she gleams after calling; but when she has gleamed and call'd, she should then have some hot meat given her, toward evening especially, and be made to eat in company. When she is well reclaimed, manned, and sharp-let, she may be fed on the lure.

But three things are to be considered before your lure be fixed on her. 1. That she be bold and familiar in company, and not afraid of dogs and horses. 2. Sharp-let and hungry, having regard to the hour of morning and evening when you would lure her. 3. Clean within, and the lure well garnished with meat on both sides. When you intend to give her the length of a leath, you must abound yourself; she must also be unhooded, and have a bit or two given her on the lure, as she fits on your fit. That done, take the lure from her, and so hide it that she may not see it; when she is unfeated, cast the lure so near her, that she may catch it within the length of her leath; and as soon as she has seized it, use your voice as falconers do, feeding her upon the lure on the ground.

After having lured your falcon, in the evening give her but little meat, and let this luring be so timely, that you may give her plumage, &c. next morning on your fit; when she has cast and gleamed, give her a little baking of warm meat about noon, tie a creance to her leath, go into the field, there give her a bit or two upon the lure, and unfeated. If you find she is sharp-let, and has eagerly seized on the lure, let a man hold her, to let her off to the lure; then unwind the creance, and draw it after you a good way.
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way, and let him who has the bird hold his right hand on the taffiel of her hood, ready to unhood her as soon as you begin to lure; to which if she come well, flump roundly upon it, and haftily seize it; let her cast two or three bits thereon; that done, take her off the lure and deliver her again to the person that held her; and, going farther off the lure, feed her as before; and so daily farther and farther off the lure. Afterwards you may lure her in company, but do not fright her; and having used her to lure on the foot, do it also on horseback; which may be sooner accomplished, by causing horsemens to be about you, when you lure her on the foot; it is also sooner done, by rewarding her upon the lure on horseback among horsemens. And when she is grown familiar this way, let somebody a-foot hold her, and he that is on horseback must call, and call the lure about his head, while the holder takes off the hood by the taffiel; and if the feize eagerly on the lure without fear of man or horse, then take off the creance, and lure at a greater distance. Lastly, if you would have her love dogs as well as the lure, call dogs when you give her plumes. See Hor. xiv. 6.

The Abbé le Pichon, in his description of falconry, represents it as one of the noblest, and also the most profitable of pleasures. For the various kinds of this diversion, the falcon, the jer-falcon, the lanner, the faker, the goshawk, the merlin, and the parrow-hawk are used; but in general the falcon and hawk are more frequently used than the red. The falcon, jer-falcon, and goshawk are in great repute; and are trained up to various flights, some of which are pointed against the heron, others against the kite, the curlew, or the owl. The hawk is used in low flights, and is flagitious and successful in attacking the partridge. The manner of training up hawks, and employing them in the field, is very agreeable. Such as are taken in the net are called "Rias," and such as are taken when full-grown, and at full liberty, are called "Haggards," or old birds. When hawks are too wild, they are neither fed, nor suffered to sleep for three or four days and nights, and are never left alone; by which means they come familiarized to the falconer, and obedient to all his commands. An unquiet hawk has been sometimes placed in a smith's shop, where, by the continued noise of the hammering, he has been made gentle. The principal care of the falconer is to accustom these birds to settle in his fill, to spring when they throw them off; to know his voice, his singing, his whistle, or any other signal he gives them, and to return to order on his fill. At first they are tied with a string about 30 fathoms in length, to prevent them from flying away; from which they are not relieved till they are completely disciplined, and return at the proper call or signal. For this purpose they must be lured. The lure is a piece of red stuff or wool, on which are fixed a bill, talons, and wings. This is likewise fastened a piece of that stuff on which the bird feeds, and the lure is thrown out to him. When they intend to reclaim or recall him, the sight of food brings him back; and in time the voice will be sufficient. The various plumes with which the lure is let off is called a "Drawer." When they accustom the hawk to fly at a kite, a heron, or a partridge, they change the drawer according to the kind of game to which he is to be devoted. When this is a kite, they fix the bill and feathers of that bird to the lure; and so of the rest; and in order to entice the bird to his object, they fallen beneath the drawer or plume the flesh of a chicken, or other fowl, occasionally searfed with sugar and spices, together with marrow and other delicacies. Thus he is prepared for springing a real game, which he does with surpassing precipitation. Having been accustomed to a month's exercise in a chamber or garden, the bird is tried in the open fields, when little bells are fastened to his feet, in order to be informed of his motions. He is always capped or hooded, that he may see no object but his game; and as soon as the dogs either leap or spring it, the falconer unhoods the bird, and toffes him into the air after his prey. His various motions in the air furnish much diversion; at length he defends and launches upon his prey with the rapidity of an arrow, and bears it to his master, who recalls him. By these first essays, he is presented with the neck and entrails of the prey which he has brought. These gratuities, and the careles of the falconer, animate the bird to the performance of his duty, and prevent him from "bearing away his hills" that is, from flying off, and not returning, which, however, is sometimes the case.

When falcons are taught to fly at rabbits, hares, &c., it is called "flying at the fur;" and some are instructed to fly at the fur and the plume, or to the pursuit of hares and rabbits, as well as ofpheasants and partridges. For this purpose, when the falcon is very tame, they either take a live hare, and break one of its legs, or else a hare's skin stuffed with straw; and having fixed to it a piece of chicken's flesh, or such food as the falcon is most fond of, they tie this skin, with a long cord, to the girth of a horse, and as the skin is thus dragged along, the bird imagines it to be a hare in flight, and is allowed to dart upon it; and is thus taught to distinguish the animal. Falcons of the larger kind have been taught to fly at the roe-deuck, and even at the wild boar, and the wolf. With this view they should be accustomed to feed, when young, from out of the pockets of the eyes of a wolf's or boar's head; the whole skin of the animal being stuffed, so as to make it appear alive. While the bird is feeding, the falconer begins to move the figure gradually; in consequence of which the bird learns to fall on itself so as to fland firm, notwithstanding the precipitate motions which are gradually given to the stuffed animal. He would lose his meal if he quitted his hold, and therefore he takes care to secure himself. When these first exercises are finished, the skin is placed on a car, drawn by a horse at full speed; the bird follows it, and is particularly feeding, and then, when they come to fly him in the field, he never fails to dart on the head of the first beast of the kind he discovers, and begins tooop out the eyes. This puts the animals into such dishabres, that the hunter has time to approach, and dispatch it with their spears.

In order to obtain birds sit for instruction, they should, possibly, be taken from the nest; but, as this is not always practicable, the wild and full-grown bird must undergo the troublesome process of education. Barons, like all other birds, may be taken by means of nets, such as are used in catching larks; but the main difficulty is that of restricting the bird. If a falcon is pursuing his prey in the air, he will not defend an immovable and limous bair on the ground.

As this is the case, the experienced falconer fixes in the centre of his net a pulley, or a strong iron wire bent into a ring, through which he passes a string, 30 or 40 fathoms long, and at its extremity ties by its leg a live pigeon, which he carries with him into his hut or cover; and as the falcon sometimes flies so high as not to be seen, the falconer furnishes him of his motions by means of a butcho bird, which is fastened by a string tied to a stick fixed near the net. This bird by its movements indicates the kind of hawk which is hovering above; if it be a buzzard, or any kind of Fuffy hawk, the butcher-bird's motions are but flight;
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but if it suddenly flies down and hides itself, it is a sign that fate large kind of falcon is above. The falconer, therefore, kicks out the pigeon, whose apparent flight of liberty attracts the sight of the falcon. If it approach readily, the man withdraws the pigeon, and, after a very short interval, lets it out again. This second appearance of the pigeon never fails to invite the falcon, which darts upon it as his prey, and is consequently caught in the net, which the man instantly draws over it. The above-described method of taking falcons, and, indeed, the art of falconry in general, seems to have been held in so high estimation by Linnaeus, since, by way of note to his specific character of "falco gentilis," he adds "ars capiendi falcones columba et lanio, inuituendi, venandi gazellas, ardeas, aviculas, &c. propriis artificiose commissa, in luxumia magnam, ridenda etiam in flutto."

Among the oldest writers on falconry we may reckon Demetrius, who, about the year 1270, was physician to the emperor Michael Paleologus. His book, written in Greek, was first printed at Paris in 1612, by Nicholas Rigalius, from a MS. in the king’s library, and with the Latin translation of Peter Gyllius. (See Fabr. Bibl. Græc. i. c. 25. vol. i. 155.) A curious precept occurs in the book of Demetrius, which requires spurious to say their prayers before they go out to the field. Some other works, of unknown antiquity, were printed at the same time.

The writers of reputation on falconry are De Baron, Franchierno, Tardivo, Artebuche, Dalagosa, Latam, &c. M. de S. Martha has put the principles of the art into fine Latin verses, in his Hierafoeophion, five De Re Accipitria, libri tres.

There is also a treatise on hunting, hawking, and heraldry, printed at St. Alban’s by Caxton, and attributed to dame Julian Barnes. Beckett’s Hist. of Inventions, &c. vol. i. Shaw’s Zoology, vol. vii. part. i.

FALCI, or FALTschi, in Geography, a town of Moldavia, on the Pruth; 32 miles E. N. E. of Birlat.

FALDAGE, a town which was formerly employed to signify an old privilege reserved by different lords of manors to themselves, for setting up sheep-folds or pens in any fields within their manors, for the purpose of having them better managed, not only with their own, but likewise with their tenants’ sheep. It was also frequently termed festa falsata, and in some particular old charters fold-fact, which at some places implied a fold course, or free-fold.

FALDELLA, in Surgery, rolled or twilled lint, used for compresses.

FALD-FEE, or FEE, in Rural Economy, is a term which was formerly used to denote a rent or fee paid by certain customary tenants for the liberty of folding their sheep upon their own lands.

FALDUSTOR was anciently used to signify the highest seat of a bishop, inclosed round with a lattice.

FALDWORTH, among the Old Writers, was used to signify a person of age, sufficient to be reckoned of some decennary.

FALLE, in Geography, a river of England, in the county of Cornwall, which rives about five miles S. E. from St. Columb Major, and runs into the sea at Falmouth.

FALEMI, a river of Africa, which runs into the Sengal; 20 miles W. of Gallam.

FALER, a town of Switzerland, in the Grisons; four miles N. N. E. of Hatzz.

FALIGE, a town of Germany, in the principality of Cumbach; five miles S. S. E. of Hof.

FALIN, a river of Chinefe Tartary, which runs into the sea of Japan. N. lat. 43° 5’. E. long. 133° 16’.

FALIOS, a town of Asiatic Turkey, on the Black sea; 24 miles W. of Amasra.

FALKANAU, a town of Sileia, in the principality of Neuflys; four miles S. of Grottkau.—Alfo, a town of Bohemia, in the circle of Saetz, on the Egra, in which are manufactures of alun, sulphur, and vitriol; 12 miles N. E. of Egra. N. lat. 50° 9’. E. long. 12° 37’.

FALKENAW, a town of Prufia, in Oberland, 22 miles S. E. of Marienwerder.—Alfo, a town of Prufia, in Ernechland; nine miles S. W. of Marienburg.

FALKENBERG, a town of the duky of Stiria; 10 miles N. of Obervortz.—Alfo, a sea-port town of Sweden, in the province of Holland, situated at the mouth of the Athron, on the Scaggareac. The chief employment of the inhabitants is fishing; 32 miles N. of Heilsberg. N. lat. 56° 50’. E. long. 12° 19’.—Alfo, a town of Germany, in the county of Lippe; two miles S. of Horn.—Alfo, a town of Saxony; five miles N. W. of Leibenwerda.—Alfo, a town of the Middle Mark of Brandenburg; seven miles E. N. E. of Pard-nwald.—Alfo, a town of Sileia, called Konigstein, in the principality of Oppeln; 14 miles W. of Oppeln. N. lat. 50° 35’. E. long. 17° 23’.

FALKENBURG, a town of Brandenburg, in the New Mark, on the Drahe; 124 miles N. E. of Berlin. N. lat. 53° 28’. E. long. 16°. See also FAUQUFORT.

FALKENHAGEN, a town of the duky of Pomerania; five miles S. of Ramelburg.—Alfo, a town of the Middle Mark of Brandenburg; 40 miles E. of Berlin. N. lat. 52° 25’. E. long. 14° 30’.

FALKENSTEIN, John Henry, in Biography, was born in 1682. He received his education at some of the Dutch or German universities, and was, in the year 1714, appointed director of the academy of Erlangen. After this he entered into the service of John Anthony, bishop of Eichfadt, by whom he was employed to write a history of the bishopric. By the death of his patron he lost his employment in the year 1730, and was taken into the service of the margrave of Anspach. In this situation he remained till the time of his death in Feb. 1767. He was buried in a tomb, which he caused to be built in his life time, and which he often visited. Falkenstein wrote much, but his works consist of matter collected without taste and judgement; but which will be found useful to the future historian. His principal performances are, "Antiquitates Nordgavienfes," or researches respecting the antiquities and every thing remarkable in regard to the town of Nordgau in three vols. fol.; "Deliciae topographicae Norimbergenses," or a geographical description of the imperial city of Nuremburg, &c.; "Antiquitates Sudgavienfes," or an historical description of those districts which in the seventh and eighth centuries were known under the general name of Sudgau, &c. Gen. Biog.

FALKENSTEIN, in Geography, a town of Austria, with a caffle, the proprietor of which has a right to coin money; 10 miles N. W. of Zittersdorf.—Alfo, a town of Austria, 10 miles S. of Aigen.—Alfo, a town of Upper Bavaria, on the Inn; 24 miles S. W. of Traunstein.—Alfo, a small county of Germany, ceded to France by the treaty of Campo Formio, and confirmed by the peace of Luneville. It contains the town of Winawiler, a town of its own name, and about 15 villages. The inhabitants are partly Roman Catholics, but chiefly Lutherans.—Alfo, a town of Germany, in Lower Bavaria, 13 miles N. of Straubing.—Alfo, a town of Germany, in the Vogtland, called Elleford; two miles S. of Aarbach.—Alfo, a town of France, in the department of Mont Tournire, but in the county of Falkenstein.

Gen. Ch. *Cal. Perianth* of one leaf, bell-shaped, with five angles, in five ovate, bluish, equal segments. Cor. of one petal, twice as long as the calyx, funnel-shaped, spreading, plaited, its margin in ten regular segments. *Stam.* Filaments five, thread-shaped, erect, rather shorter than the corolla and inserted into its tube; anthers ovate, compressed. *Pfll.* German four, superior, smooth; styles two, capillary, decurrent, the length of the corolla; *Filaments*, individual, obtuse. *Peric* none. *Seeds* four, globose, in the bottom of the calyx.


Native of watery places at the Cape of Good Hope.

*Stems* perennial, woody, creeping, branched, leafy. *Leaves* on long stalks, clustered, heart-shaped, obtuse, entire, rather fleshy, slightly downy. *Flowers* on simple, solitary, axillary white, or pale flesh-coloured, exactly like those of a *Convovulus*, to which genus professor Thunberg has now reduced this plant. Consequentially his own description of the fruit, as given above, must be exceedingly erroneous. The learned editors of the *Hortus Kewensis* has long ago corrected another mistake in the number of the flowers, which they found to be five only, as analogy would lead us to expect; not six, except from occasional luxuriance.

FALKIRK, in Geography, a considerable town in the shire of Stirling, Scotland, is situated on an eminence near the river Carron on the high road from Edinburgh to Glasgow, and commands an extensive prospect of the adjacent country. It was formerly a royal borough; but is now governed by a baron-baillie, appointed by the lord of the manor. This town is noted for several fairs, and three celebrated trials, at which are sold on an average 60,000 head of black cattle, and a great number of sheep and horses. Falkirk is 12 miles distant from Stirling, and 22 from Edinburgh; the whole parish, which includes several villages, was returned, in 1801, as containing 1767 houses, and 8838 inhabitants. The great canal, which forms a communication between the British ocean and the north channel, intercepts this parish. A degree of celebrity attaches to Falkirk from a battle fought in its vicinity July 22, 1298, when the Scots, under Sir William Wallace, were defeated by the English under Edward I.; and the town was again distinguished by an engagement between the royal and rebel forces January 18, 1746.

FALKLAND, a town in the shire of Fife, Scotland, was erected into a royal borough in 1558. The government is vested in three bailies, 14 commissars, a treasurer, and town clerk. The town is newly built, and plentifully supplied with water by leaden pipes, and carries on a considerable manufacture of coarse linens and ofinfant.

The vicinity abounds with coal and lead-ore. Falkland is 15 miles distant from Edinburgh, and about the same distance from Perth; the population of the parish was returned in 1801 as 22,231, inhabiting 460 houses. This town was formerly the residence of the kings of Scotland, and the remains of the palace, though in ruins, evince its former magnificence.

FALKLAND'S ISLANDS, a group of islands, situated in the southern Atlantic ocean, off the coast of Magellan. The first discovery of these islands is said to be by Captain Davis, the architect of *Cavendish*, in 1593. In 1593 Sir Richard Hawkins saw land, but fancied it was the same, and from observing fires he concluded that it was inhabited. In honour of his mistress, Queen Elizabeth, he called it "Hawkins's Maine-land." Long afterwards these islands were seen by some French ships, from St. Malo, and Freslier, probably for that reason, called them the "Mas- louins," and by the Spaniards they are denominated "Malinios." The two principal islands of this group, each of which is about 40 miles square, were probably distinguished by the name of Falkland's islands by captain Strong, or Strahan, in the year 1639, in honour of his count Falkland; and this name has been continued ever since. Robjewhe, who piloted thee islands in the year 1721, called them "South Behira," and they have likewise been called "Islands of St. Lewis," "Pepey's islands," and "Sebalde de Wurt's island." The name of "Pepey's" island was given to this land by Cowley, who had only a distant view of it in January 1683, who erroneously makes its latitude to be 47. But the true position and extent of these islands, and very circumstance which would render their excellence of any consequence, remained absolutely undecided till commissary Byron visited them in 1765, and Lord Anston confirmed Pepey's island and Falkland's isles as distinct places, distant from each other about 5 degrees of latitude. But Byron's researches have rectified this capital error; and it is now decided, beyond all contradiction, that as captain Cook observes, "future navigators will mislead their time, if they look for Pepey's island in latitude 47; it being now certain that Pepey's island is no other than these islands of Falkland." Byron took possession of Port Egmont, (which fbee) and all the neighbouring islands, January 1765, for his majesty king George III., by the name of Falkland's islands; and captain Macbride, who followed him thither two years after, having circumnavigated their coasts, and taken a compleat survey, a chart of Falkland's islands has been constructed, with so much accuracy, that seamen and Great Britain itself are not more authentically laid down upon our maps. "We found," says captain Macbride, "a mass of islands and of broken lands, of which the foal was nothing but a bay, and no better prospect than that of barren mountains, beaten by storms almost perpetual. Yet this is fumer, and if the winds of winter hold their natural proportion, those who lie but two ethes' length from the race must pass weeks without having any communication at all." In 1765 the French having had Canada, turned their attention towards these islands, with a view to an American settlement; and the account of Bungaree's voyage for that purpose, published by Perrot, contains simple details concerning these islands. From these we learn, that there is little herbage except on the N. E. and E., the southern antarctic winds being extremely cold. The rocks are of quartz, with some pyrites and traces of copper. Grey and reddish slate is common, with red and yellow ochres. In these islands, the soil and climate of which are unfavourable, there is a considerable variety of fowls and fish; and the plants seem somewhat to resemble those of Canada. The walrus, and other animals of the sea kind, frequent the shores. Although Byron made a small establishment at Port Egmont, it was found to be of little use: no value, and
in the year 1774 it was ceded to Spain. These islands, which seem to be unit for the habitation even of savages, occasioned some ridiculous disputes; and this circumstance is the more extraordinary, as they are covered with reeds and mofa, and are subject to perpetual fogs, and furious tempests from the antarctic pole. The extreme cold cannot be relieved by fire, as there is no material for fuel, though Cowley says, that it abounded with woods; and even a ship in the port is covered with perpetual snow. The penguins supply a scanty and miserable food. S. lat. 51° 6' to 52° 30'. W. long. 56° 30' to 62° 46'.

FALLING, a town of Sweden, in West Gotland; 56 miles E. of Uddevalla. N. lat. 58° 12'. E. long. 13° 16'.

FALL, a river of Scotland, which rises in the S.W. part of Perthshire, and runs into Loch Lomond.

FALLING, Indians of North America, who occupy a territory, through which runs Red Deer river in N. lat. between 51° and 52°, and between 110° and 115° W. longitude. These Indians, called also Big-Bellied Indians, amount to about 900 warriors. They seem to have migrated from the fourth-earward, and belong to a people who inhabit the plains from the north bend of the Mississippi river, N. lat. 47° 32'. W. long. 101° 25'. to the south bend of the Affiaiboain river, to the number of 500 men. Some of them occasionally come to the latter river to exchange dress'd buffalo robes, and bad wolf skins for articles of no great value. The Fall Indians, mixed with the Affiaiboains, resuming the territory next lake Winipic, and about its source, to the Algonquins and Kniffeneaux, occupy the more central parts of the country. They do not exceed 500 families. They are not beaver-hunters, like those last mentioned, but confine themselves to the hunting of the buffalo, and trapping wolves, which cover the country. What they do not want of the former for raiment and food, they sometimes make into "pemmican," or pounded meat, while they melt the fat, and prepare the skins in their hair, for winter. The wolves they never eat, but produce a tallow from their fat, and prepare their skins; all which they bring to exchange for arms and ammunition, rum, tobacco, knives, and various baubles, with those who go to traffic in their country. Mackenzie's Voyage, &c. Intro.

FALL, a town of America, in Bristol county, Massachusettts, lately the southerly part of Freetown, incorporated in 1803; 50 miles S. of Boston.

FALL, a township of Bucks county, in Pennsylvania; containing 1680 inhabitants.

FALL, Defect, in Physics, the tendency of any heavy body towards the centre of the earth.

Galileo first discovered the ratio of the acceleration of falling bodies; viz. that dividing the whole time of falling into equal parts, the body will fall twice as far in the second moment as in the first, five times as far in the third; seven times in the fourth, &c. and so on in the order of the uneven numbers. See ACCELERATION.

FALL, of bodies, for the cause of the. See GRAVITY.

FALL, of bodies, for the laws of. See ACCELERATION, DESCENT, and FORCE.

FALL, Water. See Cataract.

FALL is also used in a moral sense: as the fall of Adam, See ORIGINAL SIN; the fall of the Roman empire, &c. Authors contend, that Plato had a notion of Adam's fall, which he had learnt from Moses. Euthyphron, De Preparat. Evangel. lib. xii. cap. 11. quotes a fable from Plato's Sym.

FALL, in Music and Poetry. See CACONDE.

FALL, in Agriculture, a measure of length, which in some places signifies the same as the rod; but in others, as the northern parts of the kingdom of Scotland, it denotes a measure which contains six of the ells of that country, each of which is equivalent to thirty-seven or ten tenths English inches. See Measure, and Weights and MEASURES.

It is a measure also frequently made use of in the application of marle, and other similar earthy substances to land, especially in the northern counties, in which cafes, from two to four or five falls are considered a proper set. See MARL.

FALL, a superficial measure, is the Scotch pole of land = 50 Scotch ells, = 342.25 Scotch feet, = 38.027 Scotch yards, = 345.96 square English feet, = 38.44 square English yards, = 1.27 English perches.

FALL, a solid measure, is used in Lancashire in measuring marle, and is a cube, whose edge is four yards, = 04 cubic yards.

FALL, among Seamen, denotes the rope that connects the blocks of a tackle; and sometimes it signifies that part of the rope of a tackle which is hauled upon. They say also that a ship hath falls when the ick is not fluid, but hath risings of some parts of her decks more than others. Also, a ship is said to fall off, when, being under sail, she keeps not so near the wind as she should do.

FALL, aboard of, is to strike or encounter another ship, when one or both are in motion; or to be driven upon a ship by the force of the wind or current.

FALL a-stern, is to be driven backwards, or to retreat with the stern foremost; and is expressed of the motion of a ship, either under sail or at anchor.

FALL calm, expresses a total cessation of the wind.

FALL drawn, is to fail or be conducted from any part of a river, towards some other part nearer its mouth or opening.

FALL, Cat. See CAT-heads.

FALL, of the Leaf, in Vegetable Physiology, is that spontaneous separation of the leaves of trees and shrubs from their branches, which regularly takes place every autumn in such species as are, for that reason, termed deciduous, and which happens, sooner or later, to all leaves whatever (See DECIDUOUS.) Leaves commonly undergo considerable changes before they fall, ceasing to grow for a long time previous to their decay; they become gradually more rigid and less juicy, often parting with their pubescence, and always changing their healthy green colour to more or less of a yellow, sometimes a reddish hue. American trees and shrubs in general, and such European ones as are botanically related to them, are remarkable for the rich tints of red, purple, or even blue, which their leaves assume before they fall. Hence the autumnal foliage of the woods of North America is, beyond all imagination, rich and splendid. In tropical countries, though many trees lose all their leaves regularly in the rainy season, or winter, the generality are evergreen, parting with them in succession only, so as never to be naked. Even these trees, however, if injured by transplantaion, or any other cause not absolutely fatal, call their leaves prematurely, by an effort of the vital energy, which is thus able to withdraw itself with more vigour
vigour into the most important organs. On this principle we have, under the head above cited, explained the fall of leaves as a sloughing, or callling off diseased or exhausted parts. S.

FALCACY, Fallegacy, a deception, or false appearance, or report.

The Epicureans deny that there is any such thing as a fallacy of the senses. According to them, all our sensations, and all our perceptions both of sense and phantasm, are true; they add, that sense itself is the first grand criterion of truth. That the senses are never deceived, they argue from their being incapable of all rationation and remembrance: hence they can neither add, take away, corrupt, nor disjoin; they cannot, therefore, infer, conclude, or invent; and consequentely they cannot deceive by any inference or invention. This the mind may do, but not the sense, whose baffle is only to apprehend what is present, e.g. colours; not to discern or distinguish between this body and that. But a thing that hardly apprehends, without pronouncing anything, cannot deceive; i.e. that there is nothing to convict our senses of falsehood. The right eye, e.g. cannot convict the left; nor Plato's eyes the gods of Socrates; since the reasons or pretensions of each are equal; and the publid person sees what he feels as much as the lycence. Nor can a sense of one kind convict another; as the fight the smell; because their objects are different, and consequentely their reports or judgments are not of the same things. Thus, again, if I see a fiek ftrait when out of the water, but when in it, crooked, my perception is altogether as true in the latter as in the former case; i.e. it is as true that I have the perception of idea of the crooked fiek as of the ftrait one; and this idea is all that the sense faguards, so that it does not deceive. Lastly, reason cannot flor our fenses millaken, since all reasoning depends on previous sensations, and the fenses mill beft be true, before any reasoning, found thereon, can be fo. Thus the Epicureans, whose fyllep is strongly confirmed by what we have already laid down from Dr. Berkeley, concerning excellence.

The Cartesians, on the other hand, are continually explaining against the fenses, as the great sources of all deception. Every thing with which our external fenses present us, they say, should be suspected as false or, at best, dubious, till our reafon has confirmed the report. They add, that our fenses, as being fallacious, were never given us by nature for the discovery of the truth, but only to point out what things are convenient or hurtful to our bodies.

The Peripatetics keep a middle course: they hold, that if a fenible object be taken in its common and general view, the sense cannot be deceived about it; for the light can see nothing but what is visible, nor can it err in perceiving what is visible, quatenus such. But they add, that if the object be taken under its specific view, the sense may be mislaid about it; viz. from a want of the dispositions necessary to a just sensation; as a disorder in the eye, or something uncommon in the medium, &c.

FALCACY, in Logica, or fallegyphic fallacy, is a capacious argument, called also a sophism.

Fallacies either arise from words or things: the foundation of an illusion and falacy in words is ambiguity, which is of two kinds; viz. simple homonymy, and amphibology.

The kinds of falacy in things are very numerous; but they may be reduced to seven general heads; viz. ignariato elenchii, petitio principii, falsa causa, inter-
Falling.

The earthy parts of these were all of them flex and magnetic, in which were intermixed small grains of metallic iron. Upon a more minute examination of the metallic particles, they were found connected with another metal, nickel. It is a curious circumstance, and not remarked, we believe, by any writer on this subject, that iron and nickel are the only two magnetic metals; but whether this coincidence is accidental, or relates to their mode of formation, we shall not pretend to determine.

The peculiarity of this composition, which was the same in all these masses of native iron found formerly in Siberia, excited a suspicion that they might all have had one common origin. The great mass of iron found by Palladas in Siberia, contained within its spongy sublimated small drops of a transparent body, resembling chrysolite. Mr. Howard was, therefore, desirous of ascertaining whether these transparent particles, though differing in appearance from the stones he had already analyzed, might not contain similar ingredients, and on making proper experiments he found they actually contained the two earths above mentioned, flex and magnesia. Since these investigations of Mr. Howard the subject has attracted very general attention, and most of the fragments of stones fell to have fallen from heaven, and which have been preserved in the cabinets of the curious on account of this tradition, have been analyzed, and found to consist of all the same ingredients, varying only in their different proportions.

The iron found in these masses differs from our artificial iron in containing no charcoal, and the proportion of nickel prevails it from rust. The mixture with nickel is not uniform in the same specimen, but it is unequally distributed, as if it were the effect either of prelude or imperfect fusion.

Several writers, particularly Dr. Chladni on the continent, and Mr. King of our own country, have been at great pains to collect the various testimonies that are to be found in different authors from the earliest times, in favour of the occasional descent of fragments and showers of stones.

Pliny relates, that a great stone fell near Egos Ptolemaic, in the Thracian Chermones, in the second year of the 78th Olympiad. Considering the immense time that these masses may remain undetected, it is not absolutely impossible, if ever that country becomes more civilized than at present, that some intelligent traveller may find vestiges of it still remaining. Amasorgus the astronomer is said to have predicted this event; a circumstance that should teach us to receive with great caution the traditional predictions of eclipses, such as that of the fun by Thales, most of these events, and others of the same nature, having been predicted most probably long after they happened. This weakness was not peculiar to the ancients; this very summer (1809) a heliotrope was very generally prevalent that the late un

The weight of these stones was generally very great, and was measured in pounds. They were found in various countries, and to which a similar history is attached, contained very peculiar ingredients, and all of the same kind.

In the year 1756 another large stone is, on the authority of Paul Lucas, then at Larissa, said to have fallen in Macedon: it weighed 72 pounds.

Cardan affirms us, that a shower of at least 1200 stones fell in Italy, the largest of which weighed 120 pounds; and their fall was accompanied by a great light in the air.

In the Phil. Trans. for 1718 is a description of a fiery meteor seen at Jamaica, which struck the earth, and made several holes.

In the Translations for 1725 an account is to be found of a fire-ball which burst at Mixburg, in Northamptonshire, and two holes were made, about a yard deep and five inches in diameter, in a gravelly soil. An iron ball shot perpendicularly from a mortar did not make a greater impression. In searching the holes, a very hard glazed stone was found, ten inches
inches long, six wide, and four thick, cracked into two pieces. A man was killed by what is called the lightning; he was much wounded, with some appearance of electric effects.

At Otumpa, in South America, in the Chaco Guallandia, far from any mines or rocks, a man's or about 300 shillings was found, and which was then supposed to be of volcanic origin. Phil. Trans. 1788.

Mr. Southey, in his Travels through Portugal, mentions the stones that fell in Portugal, 1796.

The cause, or great black stone, preferred by the Mahometans in the temple of Mecca, had probably a celestial origin. It is said to have been brought from heaven by the angel Gabriel. Of its chemical nature we have no account, nor would it be safe for a modern chemist to attempt to procure a piece to satisfy our curiosity.

The following are some of the best authenticated and most interesting of the accounts lately published relating to these bodies.

Prizes verba! of a flower of stones which fell near Avignon, in the department of Vauncluse.

On the 8th of September, 18th year of the republic, about half past ten in the morning, there appearing only a few light clouds in the heavens, and the weather being remarkably calm, a noise, resembling that of a cannon fired at the distance of a quarter of a league, was heard with the same force, and attended with the same circumstances, by a number of individuals in various places, but more particularly in the country, at the distance of four or five leagues from Apt, the principal town of the fourth district of the department of Vauncluse. This noise, however, could be the effect only of an unusual explosion, because it is certain that throughout the whole extent above-mentioned, and at that hour, no cannon was fired, nor was there any explosion of gun-powder. This circumstance, which at first surprised all who were witnesses of it, was accompanied by a phenomenon still more extraordinary. On the same day, and at the same hour, citizen Joseph Jull, a farmer in the district of Apt, and his wife, being about 500 paces from the country-house of citizen Bartholomew de Vaux, situated north of the town of Apt, at the distance of about a quarter of a league, in the limits of Saucette, having heard the noise above-mentioned, immediately afterwards heard for the space of six or seven minutes a whistling, which increased in sound as it approached, and announced the fall of some solid body. Being terrified, and calling their eyes upwards, the wife of Jull perceived a black substance, whole fall to the ground both she and her husband heard distinctly, after which the whistling ceased. The wife of Jull states, that this black substance must have fallen in the vineyard of citizen de Vaux; the wife of the latter being then in the fields heard the same noise and subsequent whistling, but being alarmed ran into the house, and neither saw nor heard the fall of the above substance. Her son, being then at work 3 or 400 paces from the house, also heard the noise, the whistling, and the sound of the fall of a body, which, however, he did not see. At the same instant, Margaret Hugues, widow, and Marie Jean, wife of Jacques Julien, being on the road from Villeurs to Apt, heard the same noise, the whistling, and the fall of some substance in de Vaux's vineyard, which adjoins the same road. After the sound of the fall the whistling ceased. It appeared to them that the above substance did not fall at more than 30 paces from them.

As soon as the report was spread that some considerable substance had fallen in the above vineyard, a great eagerness was manifested to search for it. The attempt was at first fruitless, but on the 10th de Vaux's son, crossing the vineyard, received, at the distance of about thirty paces from the house, a large hole nearly made between two rows of vines, which denoted the place where the substance must have fallen. He was confirmed in this opinion when he perceived that some small pebbles near the mouth of the hole had been ground to powder. He then dug and found an extremely hard stone, weighing seven pounds six ounces; and could not doubt that this was the substance, the fall of which had alarmed the neighbourhood.

Extract of a memoir of M. de Dree, read in the National Institute, 11th April, 1803. M. de Dree, being at Lyons, received the following account from Dr. Petetin.

About four years ago, said he, during the evening twilight, in the month of March, the weather being serene, and not at all cloudy, there passed over Lyons, nearly in a direction from east to west, a luminous ball, which, as it attracted attention by the strong light it emitted in its passage, was almost generally observed. He added, that he learned, a few days after, that this luminous globe had been seen by some travellers on mount Cenis, and he was informed at the same time that it had fallen in the environs of Ville Franche under the form of an incandescent stone, a small fragment of which was sent to him.

He denied me also that a comparison he then made of the periods at which the meteor had been observed at Mount Cenis, at Lyons, and at Ville Franche, positively announced that it was the same ball which had traversed that line, and was to be seen from these points.

I expressed to Dr. Petetin a desire of seeing the fragments of this stone which he had in his possession, and the doctor, judging, no doubt, from the anxiety I shewed to obtain information respecting this phenomenon, how much I was interested in it, was kind enough to offer me this fragment in his power as long as I should find it.

I was the more diligent, indeed, to see the specimen of this mineral mass, as I had it in my power to compare it with analogous specimens, one of which fell near Wold cottage, in Yorkshire, on the 13th of December, 1795, and another in Bengal, on the 15th of December, 1798, a fragment of which I brought with me a few years ago from London, where I received it from Count de Bourbon, F. R. S. a very celebrated mineralogist.

Some time after, Dr. Petetin sent me the fragment in question, and I was much surprised to find that it had a perfect similarity to specimens of those which fell at Benares and at Wold cottage, a similarity manifest, not only in regard to the genus of the stones, but to the mineralogical species which enter into their composition, and also in regard to the effects resulting from their motion in the atmospheric fluid.

As I had reason to hope I should be able to discover the exact spot where this globe fell, I made researches in the neighbourhood of Ville Franche, and was directed towards the commune of Sales; at about the distance of a league and half to the north-west of Ville Franche, in the department of the Rhone, where I learned that most of the inhabitants had been witnesses of, and frightened by the arrival of this luminous body which had fallen in a vineyard within three hundred paces of the village, and near the house of a vintager, called Pierre Crepy.

I proceeded with two of the inhabitants, both acquainted with the fact, towards the house of Crepy, and on the spot where the stone buried itself received every information respecting it, and obtained the last specimen which Crepy had remaining.
The following are all the circumstances I collected in regard to this singular phenomenon, omitting the unessential reasoning in regard to its authenticity.

On the 12th of March, 1798, about six in the evening, the weather being calm and serene, a luminous globe, of an extraordinary appearance, attracted the eyes of the inhabitants of the commune of Sales, and of the neighbouring villages, as they were returning from their labour; and by its rapid approach and horrid noise, like that produced by an irregular and hollow body traversing the atmosphere with rapidity, threw all the inhabitants of that commune into the greatest terror, especially when they saw it pass over their heads at a very little elevation.

According to their report, this ball kept behind it a long train of light, and emitted, with an almost continual crackling noise, small blue sparks, like small flares.

Its fall was observed by three workmen, who were not more than fifty paces from it. One of them was so much alarmed, that he dropped his coat and a billet of wood, that he might escape as fast as possible. The other two fled to Sales, where a general alarm prevailed. These three witnesses agree that the body moved with astonishing rapidity, and that after its fall they heard a hissing noise, proceeding from the spot where it buried itself.

In regard to Crepier he was at home, where he was so much terrified with the hissing of the body and noise of its fall, that he shut himself up, and spent the night without daring to go out.

Next morning he was called out by the two workmen who had observed it, and they went with M. Blondel, adjunct of Sales, and several other persons, to the place where the subsidence buried itself. At the bottom of a hollow, eighteen inches in depth, they found a large, black, irregular oval mass, entirely covered with a blackish crust; it was no longer warm, and had the smell of gunpowder. It was split in several places, so that thrilling a stick into one of the fissures made it fall to pieces. The weight of this stone was about twenty pounds.

M. Place, a merchant of Ville Franche, assured me he was a witness, as well as many other inhabitants, of the passage of this luminous globe over the town; that he heard its humming noise; that its elevation could not exceed 500 toises, and that its direction was from south to west by north.

It now appears that this meteor was seen by M. Pictet, and other inhabitants of Geneva, and of the neighbouring towns as far as Bern; they observed a luminous body which suddenly appeared in the southern regions proceeding rapidly from west to east. This phenomenon was then considered as a meteor, but M. Pictet is now persuaded it is the same body which fell at Sales.

M. Biot, the celebrated astronomer and mathematician, has drawn up a very accurate memoir of the meteoric mals that fell in the neighbourhood of Laigle; the most interesting particulars of which we have extracted, and are as follow.

July 20, 1803. I went first to Alençon, fifteen leagues west-south-west of Laigle, and in going thither I learned that a globe of fire had been seen proceeding towards the north; the appearance of this globe had been followed by a violent explosion. This took place on the 26th of April, 1802, at one in the afternoon. By the direction of this phenomenon, the day, and particularly the hour, I judged that this had been the commencement of the meteor of Laigle. At Alençon nothing had been heard, in consequence, no doubt, of the noise which usually prevails in a large town, but I learnt by the mineralogical collections of the country that nothing exists in the neighbourhood of Laigle which has any resemblance to the meteoric stones. From Alençon I proceeded to Laigle, traversing the villages conducted by the accounts given me by the inhabitants. All of them had heard the meteor on the day, and at the hour mentioned. In this manner I reached Laigle, and proceeded to the house of our colleague, Le Blond.

The meteor did not burst at Laigle, but at the distance of half a league from it. I saw the awrtful traces of this phenomenon. I traversed all the places where it had been heard, and collected and compared the accounts of the inhabitants. At last I found some of the stones themselves on the spot, and they exhibited physical characters, which admitted no doubt of the reality of their fall.

If we first consider the physical testimonies, no meteoric stones had been in the hands of the inhabitants before the explosion on the 26th of April.

The mineralogical collections formed on the spot with the greatest care, for several years, contained nothing of the kind.

The foundries, iron-works, and mines in the neighbourhood which I visited exhibited nothing in their productions, or their fission, which had the least affinity to these substances. No traces of a volcano are found in the country.

Suddenly, and only since the time of the meteor, these stones have been found on the ground, and in the possession of the inhabitants, who are better acquainted with them than any other persons.

These stones are only found in a certain extent, in ground foreign to the subsidence they contain, and in places where, from their size and number, it is impossible they could have escaped notice.

The largest of these stones, when broken, still exhale a strong sulphureous smell from their interior parts. That of their surface has vanished, and the smallest exhaled no sensible odour, so that the odour of the former seems likely to be dissipated in the course of time.

Traces, which strongly attest the fall of these stones, never mentioned without terror, are still known. The inhabitants say they saw them descend along the roofs of the houses like hail, break the branches of the trees, and rebound on the pavement. The earth smokcd round the largest of them, and they fell burnt after they had landed in their hands. These accounts are given, and the traces shown only in a certain extent. It is there only that meteoric stones are found on the ground; not a fragment is found beyond that district.

From the aggregate of the testimonies, we have deduced the following account of the phenomenon.

On Tuesday, April 26th, 1802, about one in the afternoon, the weather being serene, there was observed from Caen, Pont, Audemer, and the environs of Alençon, Falaise, and Verneuil, a fiery globe of a very brilliant splendour, which moved in the atmosphere with great rapidity. Some moments after there was heard at Laigle, and in the environs of that city, to the extent of more than thirty leagues in every direction, a violent explosion, which lasted five or six minutes.

At first there were three or four reports like those of a cannon, followed by a kind of discharge resembling a firing of musketry; after which there was heard a dreadful rumbling, like the beating of a drum. The air was calm, and the sky serene, except a few clouds, such as are frequently observed.

This noise proceeded from a small cloud which had a rectangular
rectangular form, the largest side being in a direction from east to west. It appeared motionless all the time the phenomenon lasted, but the vapour of which it was composed was projected momentarily from the different sides, by the effect of the different explosions. This cloud was about half a league to the north-north-east of the town of Laigle; it was at a great elevation in the atmosphere, for the inhabitants of two hamlets, a league distant from each other, saw it at the same time above their heads. In the whole canton over which this cloud hovered, a hissing noise, like that of a stone discharged from a sling, was heard, and a multitude of mineral flakes, exactly similar to those distinguished by the name of *meteoric stones*, were seen to fall at the same time.

The district in which these stones fell forms an elliptical extent of about two leagues and a half in length, and nearly one in breadth; the greatest dimension being in a direction from south-east to north-west, forming a declination of about 22°. This direction, which the meteor must have followed, is exactly that of the magnetic meridian, which is a remarkable result.

The largest of these stones fell at the south-east extremity of the large axis of the ellipse, the middle ones fell in the centre, and the smallest at the other extremity. It thereby appears that the largest fell first, as might naturally be supposed.

The largest of all those which fell weighed 171 pounds; the smallest fell weighed two gros, which is the thousandth part of the former. The number that fell is certainly above two or three thousand.

On the 5th of April, 1824, another stone of this kind fell near Glasgow, the particulars of which were very well ascertained by several professional gentlemen belonging to the university of that place. They are related in the 18th volume of the Philosophical Magazine. On the day above mentioned three men, at work in a field at Poffil, about three miles north of Glasgow, were alarmed with a singular noise, which they think continued about two minutes, seeming to proceed from the south-east to the north-west. At first it seemed to resemble four reports from the firing of cannon; afterwards, the sound of a bell, or rather gong, with a violently whizzing noise; and lastly, they heard a sound, as if some hard body had struck with great force the surface of the earth. On the same day, in the forenoon, sixteen men were at work in the Poffil quarry, thirty feet below the surface of the ground, and there, too, an uncommon noise was heard, which, it is said, ceased at first to proceed from the firing of some cannon; but afterwards the sound of hard substances hurrying downwards over stones, and continuing, in the whole, for about the space of a minute.

By others who were at the quarry, viz. the overseer of the quarry, and a man in a tree, to whom he was giving directions, the noise is described as continuing about two minutes, appearing as if it began in the well, and paused round by the north towards the east; along with these people there were two boys of ten and four years old, and a dog; the dog, on hearing the noise, ran home in a great fright. The overseer, during the continuance of the noise, looking up at the atmosphere, observed in it a milky commotion, which alarmed him, and he called to the man in the tree. "Come down, I think there is some judgment coming upon us;" and he says that the man in the tree had fearfully got on the ground, when something struck with great force in a drain made for turning off water, about ninety yards distance, splashing mud and water about twenty feet round. The elder boy, led by the noise to look up to the atmosphere, says, that he observed the appearance of smoke in it, with something of a reddish colour moving rapidly through the air from the well, till it fell on the ground. The younger boy, at the instant before the stroke was heard, called out, "Oh, such a rock!" and says he saw an appearance of smoke near the place where the body fell. The overseer immediately ran up to the place where the splashing was heard, when he saw a hole made at the bottom of the drain. The hole was filling with water from a small stream, and about six inches of it remained empty: he thrust his hand into the hole, (which was nearly perpendicular, the bottom a very little inclined to the east, and the upper part to the west,) and felt something hard at the bottom, which he could not move. The hole was cleared out, expecting a cannon-ball, but nothing observed except the natural stratum of soil, and the rock on which it lay, and two pieces of stone that had penetrated a few inches into the rock; he thought they were whinstone, and that they were eighteen inches below the bottom of the drain, and the hole fifteen inches diameter; no particular heat was observed in the water, nor in the pieces of stone, nor any uncommon smell in the latter. The one piece of stone was about two inches long; the other six inches long, four broad, and four thick, blunted at the edges and end; the fractures coincided; he did not know whether the fracture was caused by the fall or the mallet; and says that he never saw any such stone about the quarry.

Some days after, when the particulars came to be known, a search was made for these stones, and the first mentioned piece was soon found; the other, having fallen among rubbish, was missing; a few days after a fragment of it was found: the two fragments make the two extremes of the stone; on the surface they are pretty smooth, of a black colour, internally of a greyish appearance; the intermediate part seems as yet to be lost. It may be proper to remark, though the overseer did not observe any particular smell in the stone, that when Mr. Crawford obtained the first piece it had a fihy and fweet smell; and the second had the same, but in a less degree. No warmth, however, was perceived in them at any period.

Account of a stone lately fallen in Russia.—On the 13th of March last, in the afternoon, the inhabitants of the canton of Juchnow, in the government of Smolensk, were alarmed by an uncommon loud clap of thunder. At the moment of this explosion two peaks belonging to the village of Peremelchajen, in the canton of Werrejts, being out in the fields, perceived, at the distance of forty paces, a black stone of considerable magnitude falling to the earth, which it penetrated to a considerable depth below the snow. It was dug up, and found to be of an oblong square figure, of a black colour, resembling coal; its surface was very smooth, shaped like a coin on one side, and it weighed about 160 pounds. Philosophical Magazine, 1807.

But one of the best authenticated accounts we have yet received is from Connecticut, in America; the circumstances of which were communicated by Charles Grevelle, esq. F. R. S. to whom they were originally transmitted.

The particulars of this phenomenon were collected with great care by Messieurs Silliman and Kingley, who visited and carefully examined every spot where the stones had been ascertained to have fallen: they conversed with all the principal original witnesses, and spent several days in the investigation of all the important facts that could be collected on this occasion. The substance of the account is as follows. The meteor, which has to recently excited alarm in many, and astonishment in all, first made its appearance in Wefton, about a quarter or half past five o'clock A. M. on Monday the fourteenth instant (Dec. 1827.). The mor-
ing was somewhat cloudy, mingled with spots of clear sky, a space of 15° along the northern horizon perfectly clear; there was little or no light except from the moon just setting. Judge Wheeler was passing through the endorifice adjoining his house, with his face towards the north, and his eyes on the ground, when a sudden flash across the northern sky made him look up; he immediately discovered a globe of fire, passing behind the first cloud, which was very dark, and obscured the meteor. In this situation its appearance was distinct, like the sun seen through a mill.

It rose from the north, and proceeded in a direction nearly perpendicular to the horizon, but inclining by a very small angle towards the west, deviating from the plane of a great circle, but in large curves, sometimes on one side of the plane, and sometimes on the other, but never more than four or five degrees; it appeared about one-half or two-thirds the diameter of the full moon, but it was impossible to ascertain what angle it subtended. Its progress was not so rapid as that of common meteors and shooting stars; when it passed the clear sky it flashed with a vivid light, not so intense as lightning in a thunder storm, but like what is called heat lightning. Its surface was apparently convex. When not too much obscured by clouds, a conical train of paler light attended it, waving, and in length about 10 or 12 diameters of the body. In the clear sky there was a brisk incandescence about it, like a fire-brand carried against the wind. It disappared about 15° short of the zenith, and the fame number well of the meridian; it did not vanish instantaneously, but grew fainter, as a red-hot cannon ball would do, cooling in the dark, only much more rapidly. There was no particular smell in the atmosphere, nor any luminous masses seen to separate from the body; the whole period between its appearance and extinction was estimated at 30 seconds.

About 30 or 40 seconds after this, three loud and distinct reports, like those of a four pounder, near at hand, were heard; they succeeded each other rapidly, and did not occupy above three seconds; then followed a continued rumbling, like a cannon ball rolling over a floor, sometimes louder and sometimes fainter; some compared it to a waggon running down a flisy hill, others to a running fire; this noise continued as long as the body was in rising, and died away in the directions from which the meteor came. A Mr. Ellis Staples said, that when the meteor disappeared, there were three successive efforts or leaps of the ball, which grew more dim with every throw, and disappeared within the last.

We now proceed to the fall of a number of masses of stone, in several places principally within the town of Welton. The places which had been well ascertained at the period of our investigation were six, the most remote nine or ten miles distant from each other, in a line differing little from the course of the meteor. It is, therefore, probable, that the successive masses fell in this order, the most northerly first, the most southerly last. We think we can point out the three places where the stones fell, corresponding with the three reports and leaps of the meteor. In every instance, immediately after the explosions had ceased, there was observed a loud whistling at all the places, and at the moment of the fall; after this was heard an abrupt noise, like a ponderous body striking the ground. Excepting one, the stones were more or less broken.

The most northerly fall was within the limits of Huntington, on the borders of Welton, about 50 rods east of the great road from Bridgeport to Newton, in a crook road, near the house of Mr. Den; he was standing in the road when the stone fell; the noise produced by its collision with a rock of granite, on which it fell, was very loud; Mr. Burr was within 50 feet, and searched for the body; but it being dark did not find it till an hour after. By the fall the stone was reduced to powder, and the rest broke in small fragments, thrown round to the distance of 30 feet; the granite was taken at the place of contact with a deep lead-colour; the largest fragment did not exceed the size of a goose egg, and this was still warm; there was reason to suppose the stone must have weighed 25 pounds.

The masses of the second explosion fell in the vicinity of Mr. Prince's, in Welton, about five miles south of Mr. Burr's. The family were in bed when they heard a noise of the fall of a heavy body after the explosion. They would have paid no further attention to the circumstance, had they not heard that stones had fallen in other parts of the town; this induced them towards evening to search a hole newly made in the yard, where they found a stone buried in the loose earth which had fallen on it; it was two feet from the surface, the hole 12 inches diameter, and as the earth was soft the mass was little injured, only a few small fragments being detached. It weighed 35 pounds.

Six days after another mass was discovered, half a mile north-west of Mr. Prince's; the search was induced by the percussion of the neighbours that they heard it fall near the spot where it was found buried. It weighed from seven to ten pounds, and was split in fragments, having fallen on a detached mass of gneiss rock which it had split in two. We found another mass, of thirteen pounds weight, half a mile north-east of Mr. Prince's; it was broken only in two pieces, one of which we purchased, for it was now become an article of sale.

A fifth mass fell two miles south-east of Mr. Prince's at the foot of Taftown hill. Its fall was heard by Mr. Porter and his family. They saw a smoke rise, from the spot where they found a stone, in the road, which had penetrated two feet in the deep, place, the hole twenty inches diameter, and the margin coloured blue from the powder of the stone, which weighed 25 pounds.

It is probable that the four last stones were projected at the second explosion, and one has been since found on the neighbouring hill, weighing 35 pounds, which must be referred to the same.

A mass of stone, far exceeding the united weight of all we have described, fell in a field belonging to Mr. Seely, within 30 rods of his house.

A circumstance attended the fall of this which seems peculiar to it. Mr. Staples lives on the hill, at the bottom of which this body fell. After the last explosion a noise like a whirlwind passed to the east of his house, and over his orchard; at the same instant a streak of light passed over it in a large curve, and seemed to pierce the ground; a shock was felt, and a report heard like that of a heavy body striking the earth.

Three or four hours after this, Mr. Seely went to look after his cattle. Some had leaped into the adjoining enclosure, and appeared frightened; passing on he was surprised to find a spot of ground all torn up, and the earth looking fresh. Coming to the place he found a great mass of fragments of some strange-looking stone.

Here were striking proofs of a violent collision; a ridge of micaceous schistus, lying nearly even with the ground, and somewhat inclining like the hill to the south-east, was flexed to pieces to a certain extent by the impulses of the stone, which thus received a fall more oblique direction, and forced itself into the earth to the depth of three feet, leaving a hole of five feet in length, and four and a half in breadth; throwing
throwing large masses of turf, and fragments of stone and earth, to the distance of 50 and 100 feet.

This stone was all in fragments, none of which exceeded the size of a man's fist. From the best information we could obtain of the quantity of fragments of this last stone, compared with its specific gravity, we concluded that its weight could not have fallen much short of 200 pounds. All the stones when first found were friable; this was especially the case where they had been buried in the moor earth, but by exposure to the air they gradually hardened.

The specimens obtained from all the different places are perfectly similar. The most careful observer would instantly pronounce them portions of a common mass, different from any of the stones commonly seen on this globe. Of their form nothing certain can be said. Few of the specimens weigh one pound; most of them less than half an ounce, from that to the fraction of an ounce. On many of them, however, may be distinctly perceived portions of the external part of the meteor.

It is everywhere covered with a thin black crust, delusive of splendour, and bounded by portions of the large irregular curve, which seems to have enclosed the meteoric mass. This curve is far from being uniform; it is sometimes depressed with concavities, such as might be produced by preying a soft substance. The surface of the crust feels harsh, like prepared fish skin or shagreen. It gives sparkles with steel. There are certain portions of the stone, covered with the black crust, which appear not to have formed a part of the outside of the meteor, but to have received this coating in the interior parts, in consequence of the fissures or cracks produced by the intense heat to which the body seems to have subjected.

The specific gravity is 3.6, water being 1.

The colour of the mass of the stone is principally a dark ash or leaden colour. It is intermixed with distinct masses, from the size of a pin's head to the diameter of one or two inches, which are almost white, resembling the crytalline feldspar in some varieties of granite, and in that species of porphyry known by the name of Nund antiqua.

The texture of the stone is granular and coarse, resembling granite. It cannot be broken with the fingers, but gives an irregular fracture with the hammer.

On inspecting the mass four distinct kinds of matter may be perceived by the eye.

1st. The stone is thickly intermixed with black globular masses, most of them spherical, some oblong. The largest are of the size of a pigeon's foot; but generally much smaller; they can be detached, and leave a concavity in the stone. They are not attractive by the magnet, and can be broke by the hammer.

2d. Masses of yellow pyrites may be observed.

3d. The whole stone is thickly intermixed with metallic points, many of them visible to the eye, and numerous with a lens. Their colour is white, and mixed with the decipherers of the stone for silver. They appear to be malleable iron alloyed with nickel.

4th. The lead-coloured mass which cements these together has been described already, and consists by far the greater part of the stone. After being wet and exposed to the air, the stone becomes covered with reddish spots, which do not appear in a fresh fracture, and arise from the rusting of the iron.

Finally, the stone has been analysed in the laboratory of this college, according to the instructions of Howard, Vanquelin, and Fourcroy. The analysis was made, the exact proportions and the steps of the analysis are reserved for more leisure.

It is sufficient to observe that the stone appears to consist of the following ingredients: filex, iron, magnesia, nickel, and sulphur.

The two first constitute by far the greatest part of the stone; the third in considerable proportion, but much less than the others; the fourth probably still less, and the sulphur exists in a small and indeterminate quantity.

Most of the iron is in a perfectly metallic state; the whole stone attracts the magnet, and this instrument takes up a large proportion of it when pulverized. Portions of metallic iron may be separated so large that they may be easily extended under the hammer. Some of the iron is in combination with sulphur in the pyrites, and probably most of the iron is alloyed by nickel.

In the Transactions for 1803 is an account by C. Greville, Esq., of three specimens in different museums in France, of stones which have fallen to the earth, all similar in their general character to those described by Mr. Howard; and also of a mass of native iron found in Persia in the year of the Hegira 1050, according to the annals of the empire, written by the emperor, and of which he is stated to have made some factories and daggers; but until other iron was mixed with that of the mass described, the iron was not malleable.

But the most beautiful specimen of perfect iron was brought from the Cape of Good Hope. Barrow, in his travels into that country, describes the original mass as existing in the interior of Africa, and it is thought that some traditioal superition is connected with it by the natives. Notwithstanding every doubt seems now to be removed as to the general authenticity of the above relations, yet philosophers are not perfectly agreed either as to the origin or mode of formation. Of the different theories that have been propounded, that which supposes them formed in the air, that is, in our atmosphere, is certainly the least analogous to our present state of chemical knowledge. Others are more inclined to assign them an astronomical origin, though great doubts still exist as to the particular clays or bodies from which they are most probably derived. Some astronomers imagine they have been thrown from a lunar volcano; there is nothing, perhaps, philosophically intolerable in this theory, for volcanic appearances have been seen in the moon; and a force such as our volcanos exert would be sufficient to project fragments that might possibly arrive at the surface of the earth. It is demonstrated by mathematicians, that if a ponderable body be projected from the earth's surface with a force sufficient to give it a certain initial velocity, it will never return. This velocity is about seven miles an hour. From the moon, the velocity requisite to produce a similar effect is about four times as great as that of a cannon-ball, so that there is nothing impossible in the supposition of these bodies having been projected from the moon. But probability is certainly against it, and it seems more likely that they are fragments of comets; because these bodies, from their great numbers, render the question of mere probability favorable to this hypothesis; and besides, from their own nature they must be subject to chemical changes of a very violent nature; to add to this, that from the smallness of their dimensions, a fragment projected from them with a very slight velocity would never return to the mass to which it originally belonged, but would traverse the celestial regions till it met with some planetary or other body sufficiently ponderous to attract it to itself. Many arguments like these concur, which lead
lead to the conjecture that the comets themselves are nothing more than large fragments of matter, which have been themselves separated by volcanic violence from other celestial bodies of greater magnitude than themselves; perhaps from fixed stars. The theory of the new planets, as suggested by Olbers, likewise continues to gain ground in the estimation of astronomers; these are by him supposed to be only portions of a large planet which once revolved about the sun in an entire form. Warranted by such strong indications, why should we hesitate to extend the analogy from our own earth to the great sidereal system? On our own planet, not only the volcanoes at present existing, but the indubitable vestiges of the old, are sufficient to convince us that great and marvellous changes are continually taking place in conformance of the chemical and mechanical action of the different elements on each other; so is it, probably, throughout the whole creation. The immensely long periods in which these changes are accomplished appear relatively to our limited scale of existence to be of great importance; but contemplated by intellect of a higher order than our own, the whole history of the sidereal universe may be a phenomenon almost instantaneous. To return, however, to this fabulous world, it still remains to add a few words on the different theories that have been suggested to explain the sudden ignition of these meteors, and the violent electric or fiery appearance which has been observed to accompany them.

Of the number of theories that have been suggested to explain the ignition of these bodies, and the explosions that often attend their arrival, very few deserve even to be noticed. So imperfect is our meteorological knowledge, that we must content ourselves with mere conjecture. The least improbable opinion of those that have been hazarded seems to be, that the inflammation and combustion of the stones proceeds from the heat necessarily extracted by the sudden compaction of the air, in conformance of the great velocity they possess on first entering our atmosphere, which velocity is afterwards much diminished by the constant resistance of the air. In this case, however, we must suppose them of the nature of pyrophoric, an hypothesis far from satisfactory. Mr. Davy's late discoveries seem likely to lead us nearer to the truth. If these earthly bodies were in their metallic state of excitation previous to their arrival on the confines of our world, their sudden inflammation would be easily accounted for, and would at the same time afford us a curious circumstance in their history, as it would be evident they came from a place where no oxygen was to be found; they could not, therefore, come from the surface of a habitable world like ours. They may, however, even on this hypothesis, have been part of the internal nucleus of some planetary or cometary body having an atmosphere, but not of sufficient thickness to have produced that inflammation which takes place when they enter ours. The electrical appearances that so often accompany these bodies in their descent indicate that the equilibrium of the atmosphere is more easily deranged than otherwise might be imagined; for certainly it is much more rational to suppose that this disturbance is rather the effect of the meteor than the cause of it. If there be any truth in the prevailing opinion of Leiden, that the firing of cannon strikes the wind, this fact will strengthen the opinion that great apparent changes may take place in the atmosphere by the various chemical operations that may accidentally take place within it. But we shall abate, however, from further conjecture, and truth, that one day the future progress of science will enable philosophers to explain, in a satisfactory manner, all the circumstances which at present seem to be involved in such complete obscurity.

But whatever be really their origin, the history of these producations we must acknowledge to be highly interesting; from the earliest times these fragments have been continually arriving at the surface of the earth, though it is only lately that they have attracted the notice of philosophers, and their history been authenticated by the superior lights of modern science. From the most ancient period of history there are repeated accounts of stones falling from heaven, which, but for the careful investigations above described, would for ever have been confounded with the fabulous prodigies so familiar to ancient credulity. And this affords a singular and striking instance, in which the true hypothesis was embraced by the ignorant and credulous part of mankind at the same time that it was rejected by philosophers. In favour of learning, however, we should observe, that it could only have been by the superior science of the present age, that facts of such an extraordinary nature could have been authenticated and separated from the multitude of fabulous and wonderful events which have been believed and recorded by the same historians.

We subjoin the following epitome of the analysis of these bodies from Thomson's Chemistry, and a table is subjoined from a French work of M. Izard.

<table>
<thead>
<tr>
<th>Substances</th>
<th>Places where they fell</th>
<th>Period of their fall</th>
<th>Testimony</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shower of stones</td>
<td>At Rome</td>
<td>Under Tollius Hoftilius</td>
<td>Livy.</td>
</tr>
<tr>
<td>Shower of fire</td>
<td>At Rome</td>
<td>Confals C. Martius and M.</td>
<td>J. Obsequens.</td>
</tr>
<tr>
<td>A very large stone</td>
<td>In Lucania</td>
<td>Torquatus</td>
<td>Pliny.</td>
</tr>
<tr>
<td>Three large stones</td>
<td>In Italy</td>
<td>Year before defeat of Caphth</td>
<td>Dion.</td>
</tr>
<tr>
<td>Shower of fire</td>
<td>In Thrace</td>
<td>2d year of 7th Olympiad</td>
<td>Pliny.</td>
</tr>
<tr>
<td>Stone of 72 lbs.</td>
<td>At Quefnoy</td>
<td>B. C. 432</td>
<td>Ch. of count Marcelli.</td>
</tr>
<tr>
<td>About 1200 stones, one of 120 lbs.</td>
<td>Near Lariffa, Macedonia</td>
<td>January 4th, 1717</td>
<td>Geoffrey le Cadet.</td>
</tr>
<tr>
<td>Another of 60 lbs.</td>
<td></td>
<td>January, 1766</td>
<td>Paul Lucas.</td>
</tr>
<tr>
<td>Another of 59 lbs.</td>
<td></td>
<td>In 1510</td>
<td>Cardon Varct.</td>
</tr>
<tr>
<td>Shower of sand for 15 hours</td>
<td>On Mount Vaife, Provence</td>
<td>November 27th, 1627</td>
<td>Gaffendi.</td>
</tr>
<tr>
<td>Sulphurous rain</td>
<td>In the Atlantic</td>
<td>April 6th, 1719</td>
<td>Pere le Feuilles.</td>
</tr>
<tr>
<td>The flame</td>
<td>Sodam and Gomorrath</td>
<td>In 1658</td>
<td>Mofes.</td>
</tr>
<tr>
<td>Shower of sulphur</td>
<td>In the duchy of Mansfeld</td>
<td>In 1646</td>
<td>Spangenberg.</td>
</tr>
<tr>
<td></td>
<td>Copenhagen</td>
<td>October, 1721</td>
<td>Olaus Durnius.</td>
</tr>
<tr>
<td></td>
<td>Brunswick</td>
<td></td>
<td>Siegrefier.</td>
</tr>
</tbody>
</table>
The flinty bodies, when found, are always hot. They commonly bury themselves some depth underground. Their size differs from a few ounces to several tons. They are usualliy roundish, and always covered with a black crust. In many cases they smell strongly of sulphur. The black crust, from the analysis of Howard, consists chiefly of oxyl of iron.

The outer surface of these flinty bodies is rough; when broken, they appear of an ash-grey colour, and of a granular texture, like sand-flinte. When examined with a microscope, four different substances may be discovered, of which the flinte is composed: 1st, a number of spherical bodies, varying in size from a pin-head to a pea, of a greyish-brown colour, opaque, breaking easily in every direction, of a compact texture, capable of scratching glass, and of giving a few feeble sparks with steel; 2d, fragments of pyrites, of an indeterminate shape, of a reddish-yellow colour, granular, and easily reduced to powder; the powder has a black colour; 3d, grains of iron in the metallic state, scattered like the pyrites through the flinte; 4th, the three substances just mentioned are cemented together by a fourth, of an earthy consistence, and so that all the other substances may be easily separated by the point of a knife, and the flinte itself crumbled, to pieces between the fingers; this cement is of a grey colour. The proportion and size of these different constituents vary considerably in different specimens; but all of them bear a striking resemblance to each other. Their specific gravity varies from 3.352 to 4.281.

From the analysis of Howard, which was conducted with much precision and accuracy, and which has been fully confirmed by Vanquelin and Klaproth, we learn that the black crust consists of a compound of iron and nickel, partly metallic and partly oxydated. The pyrites consist of iron, nickel, and sulphur. The metallic grains consist of iron, combined with about a third of its weight of nickel, and the yellow globules are composed of silex, magneisia, iron, and nickel. The count Bournon observes, that these globules resemble the chrysolite of Werner, and that their chemical analysis corresponds exactly with Klaproth's analysis of that mineral. The earthy cement consists of the very same substances, and nearly in the same proportion, as the globular substances. But it will be necessary to exhibit a specimen of some of the analyses, as published by the philosophers to whom we are indebted for them. A flinte which fell at Benares in India was analysed by Howard. The pyrites consisted of:

- 2.0 Sulphur
- 10.5 Iron
- 1.0 Nickel
- 2.0 Earths and foreign bodies

The silex bodies consisted of:

- 50.0 Silex
- 15.0 Magnesia
- 34.0 Oxyd of iron
- 2.5 Oxyd of nickel

The earthy cement consisted of:

- 48.0 Silex
- 18.0 Magnesia
- 34.0 Oxyd of iron
- 2.5 Oxyd of nickel

A flinte which fell in Yorkshire, deprived as much as possible of its metallic particles, gave Mr. Howard, from 150 grains,
The increase of weight was owing to the oxydizement of the metallic bodies.

Stones which fell at l'Agile in France, in 1803, yields, by the analysis of Vaquelin and Fourcroy,

- 75 Silex
- 37 Magnesia
- 48 Oxyd of iron
- 2 Oxyd of nickel

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The celebrated stone which fell at Ensfheim in Alsace, in 1492, yielded to the fame philosophers,

- 56 Silex
- 30 Oxyd of iron
- 120 Magnesia
- 2.4 Nickel
- 3.5 Sulphur
- 1.4 Lime

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FALLINGBOSTEL, in Geography, a town of Germany, in the principality of Lunenberg-Zell; 14 miles N.E. of Kethen.

FALLOPIA, in Botany, named by Loureiro in honour of Gabriel Fallopius, the celebrated anatomist, who excelled in the knowledge of plants. He wrote several tracts on their virtues, and also a commentary on Dioscorides. Lour. Cochinch. 335. Class and order, Polyandria Monogynia. Nat. Ord. Thalacis affine?

Gen. Ch. Cal. Perianth inferior, of five ovate, coloured, somewhat spreading leaves. Cor. Petals five, ovate-oblong, small, equal, erect. Stam. Filaments about 50, thread-shaped, unequal, inserted into the receptacle; authors roundish. Pfl. German Superf. roundish; style thick, ovate-shaped, shorter than the stamens; stigma simple. Peric. Berry globular, of one cell, with four roundish seeds.


Obf. We have presumed to correct, from analogy, the description of Loureiro, who confiders as a nectary the five small leaves which we esteem petals, and make our calyx for the corolla. He thinks there is no true perianth, but calls a common calyx what we judge by his description to be bracteas.

1. F. nervosa. Hail пуip of the Chineese. Found wild in the neighbourhood of Canton. A tree, eight feet high, with spreading branches, and a fibrous or hemp-like bark. Leaves scattered, ovate-lanceolate, somewhat serrated, ribbed, smooth. Flowers white, in small terminal clusters; petals small, each bearing three flowers, encompassed with twelve linear-lanceolate, deciduous bracteas.—As we have only Loureiro’s account to direct us, we cannot aver that this plant is not already known to systematic botanists by some other name and characters, but we have not been able to refer it to any already published.

FALLOPIAN TUBES, in Anatomy, two small tortuous canals, connected to the fundus of the uterus. See Generation, Organ of.

FALLOPII LIGAMENTUM, the inferior border of the tendon of the obliquus externus abdominis, extended from the anterior superior spine of the ileum to the angle of the pubes. See Obliques.

FALLOPII Aqueductus, a canal in the temporal bone, through which the facial nerve passes. See the description of that bone in the article Cranium.

FALLOPIO, Gabriel, or, with the Latin termination, Falloffius, in Biography, a physician of Modena, celebrated for his knowledge of anatomy. His biographers are not agreed as to the year of his birth, and consequently as to his age at the time of his death, in 1563. Calvallani, Giuliani, and Haller believe that he was born in 1523, and died in his fortieth year; which opinion seems to be the most correct. Fallopio exhibited, in his youth, the most ardent zeal in the pursuit of knowledge. After having studied anatomy under Brissuola, and others, he left Italy in order to profit by the instructions of the most eminent professors in other countries; and he is said to have attained to a depth and extent of information unusual at his age. Botany, chemistry, and astrology were among the studies to which, besides anatomy, he particularly directed his attention. He was appointed professor of anatomy at Pisa in 1548, and then went to Padua, where the fame honourable office was confided to him in 1551. He also taught botany at Padua, but with less celebrity. In fact, his anatomical excellence not only did honour to the university of Padua, where a crowd of pupils was annually induced to resort for the advantage of his instructions, but procured for himself the reputation of the most able physician of his age. He died at Padua in 1563, as already stated. Fallopio was not only distinguished as a physician and anatomist, he was also eminent in the practice of surgery; of which subject, however, he has left no writings, unless the notes written by some of the pupils who attended his lectures, and published in a careless manner by them, can be considered as such. Douglas has characterized him in a few words: “in docendo maxime methodicus, in medendo felicitissimus, in secundo expeditissimus.” He contributed to elucidate the science of anatomy by his unceasing industry, although he had certainly been anticipated in several of his discoveries, the credit of which he claimed. In attaching his name to the uterine tubes, which are believed to receive the ovum from the ovarium, and to convey it to the uterus, and are in general called the “Fallopiian tubes,” anatomists acknowledge his title to the discovery of them. It must be admitted, however, Eloy observes, that these tubes were known to the ancient anatomists, Herophilus and Rufus the Ephesian, who have left us very accurate descriptions of them. The character of this great physician, however, is little deteriorated by such circumstances; for, if he did not make all the discoveries usually attributed to him, he at least refrained those of the ancient which had fallen into oblivion. The following is a catalogue of his works. 1. “Observations Anatomicae, in libros v. digestae,” Venice, 1561; one of the best works of the sixteenth century, in which some of the errors which had escaped his master, Vesalius, are mouldly corrected. 2. “Libelli duo, alter de Uletricius, alter de Tumoribus, præter naturam,” ibid. 1563. 3. “De Termalibus aqua, libri septem; de Metallis et FoSilibus, liber,” ibid. 1564; being the substance of part of his lectures on Dioscorides, published by one of his pupils, Andre Marcolinus. 4. “De Morbo Gallico Tractatus,” Venice, 1564.
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5. "De simplicibus Medicamentis purgantibis," ibid. 1565; the substance of lectures in the form of commentary on the first book of Dioscorides. 6. "Opuscula varia," Padua, 1566. 7. "Expositio in Librum Galeni de Offibus," Venice, 1570; published by Franci Michini. 8. "De compotis medicamentorum," ibid. 1570. 9. "De parte Medicinae quae Chirurgia necupatur, nec non in libros Hippocratis de vulneribus capitis dilucidissima interpretatio," ibid. 1571. 10. "De Humani Corporis Anatome compendium," ibid. 1571. 11. "Lecciones de partibus similiaribus Corporis Human," Nuremberg, 1575; published by Coiter. 12. "Opera genuina omnia, tam Praetica, quam Theoricae, in tres tomos distributa," Venice, 1584. This work was published at Francfort in 1600, and a supplement, forming a fourth volume, in 1656. But the superior bulk of this Francfort edition is made up of a collection of notes taken from the original lectures of the author, and which are not in a style calculated for publication. A work was published at Venice in 1650, entitled "Secreti racoliti dal Faìpia," respecting which it may be observed, that Fallois was too candid and communicative to conceal any information that might be useful to mankind, and that this was probably an influence of the advantages which quackery does not fail to take of posthumous reputation to foil its impostures upon the public. Eloy Dict. Hist. Manget. Bbl. Med. Prac.

FALLOW, a colour of a palish red, like that of a brick half burnt; such is that of a fallow deer, &c.

Fallow, in Agriculture, signifies such land as has been repeatedly ploughed over, and exposed to the influence of the atmosphere, for the purpose of rendering it mellow and clean from weeds, not being fown, but left to rest after the tillage it has undergone.

But fallows have different names given to them, and are of different kinds, according to the purposes for which they are intended, and the manner in which they are made. A naked fallow is that in which the ground is ploughed and harrowed at suitable intervals for several times, according to the kind of crop that is ultimately to be grown upon it, but without being fown till it has lain for some time of length afterwards. A green fallow is that where the land has been rendered mellow and clean from weeds, by means of some kind of green crop, such as turnips, tares, peas, potatoes, &c. In this mode of fallowing no time is left by the land being left idle, or in an unproductive state.

They are also sometimes distinguished by the season of the year in which the business is either principally or wholly accomplished; hence we have summer, winter, and spring fallows, and likewise further, from their being in particular instances only performed in a partial manner, we have ballad fallows. They are also not unfrequently denominated from the particular crops which are grown upon them, or by which they are produced: consequently, we have wheat, turnip, potatoe, pea, bean, and other similar fallows.

Whatever the nature of the fallow may be, it is of great consequence that it be well made. See Fallowing of Land.

FALLOW-CLEANING MACHINES, an implement contrived for the purpose of rendering fallows clean from weeds, roots, and other prejudicial matters. It was long since invented by a blacksmith of the name of Aaron Ogden, residing at Ashton-under-Lyne, near Manchester, in the county of Lancaster. It is a complex unwieldy tool, which has been superseded by those of a much more cheap, simple, and applicable kind, such as rakes, drags, cultivators, &c. By the use of these fallows can be rendered not only free, but perfectly free from couch, and all other sorts of root weeds. But, besides this, the introduction of green fallow crops, by preventing, in a great measure, the necessity of naked or turnip fallowing, has contributed to render the use of this fort of machinery much less frequent than formerly. In improved husbandry implements of this nature are of course seldom or ever employed. A full representation of this machine is however given in the "Complete Farmer, or General Dictionary of Husbandry."

FALLOW Deer. See Deer.

FALLOW-Finch, or Fallow-Finch, in Ornithology, a name of the oenanthe, more commonly called the wheatear, and by some authors edifora. See MOTACILLA.

FALLOW Hounds. See Hounds.

FALLOWING OF LAND, in Agriculture, is the operation or process of rendering tillage-ground proper for the growth of different sorts of crops of the grain or green kinds, by repeated ploughing, harrowing, and other similar means, during the summer, autumn, or winter and spring months.

This is a practice which was had recourse to at a very early period of the art of husbandry, and which has prevailed in different countries. It was most probably first introduced and adopted as the means of bringing the more rough and coarse kinds of tillage-land into a state proper for the production of various sorts of grain crops, and afterwards continued for the purpose of keeping such as had been brought into that state free from those vegetable productions which have a tendency to injure and destroy such crops.

The more frequent introduction of green crops has since considerably lessened the necessity for this practice in different districts.

It has been observed, that in the preparation of land for the reception of grain or other sorts of crops, by repeated ploughings and harrowings, or the frequent exposure of new and fresh surfaces to the action and influence of the atmosphere, a variety of alterations and changes are produced in the earthy, as well as other kinds of materials that enter into the composition or constitution of the soils. The heavier or more earthly particles of the land, by being under different circumstances of the air and seasons thus frequently flirred and turned over, are so effectually divided or separated from each other, and broken down, that even in most of the lighter sorts of ground, as well as those of the lighter kind, there is a degree of pulverization and mellowness effected that could scarcely have been induced by any other means: in consequence of which the portions of vegetable matter that are present, and that may have been reduced into the carbonaceous state, with the cellulose, the argillaceous, and other earthy ingredients, and such metallic substances as may exist in the condition of oxides or carbonates, become so uniformly, and so extensively blended and incorporated, and the manures that are afterwards applied so minutely intermixed with them, that the fibrous roots of the growing crops, of whatever nature they may be, are enabled to penetrate and extend themselves more fully, and of course to draw more regular and varied, as well as more abundant supplies of nourishment." And that "on account of the extreme division and pulverization that take place, and the great irregularity of surface which is produced in this way, the dews and light refreshing rains that are so frequently occurring in the early spring months are more capable of being admitted and diffused through, and detained in the hollows and interstices of the ground, and thus of contributing powerfully to the support of the crops in the more inclement stages of vegetation." Also, "by the repeated turning-in and deftination of different sorts of plants of the weed kind, much vegetable mucilaginous and facecarine matter
matter may also be added, as well as the land improved by the putrefactive fermentation that must from these causes be constantly taking place." It is added, that "there are also other modes in which advantages may be gained by the repeated turning over and breaking down of the particles of soils, as from much of the atmospheric air being by such methods of husbandry blended with the fine particles or particles of soils, and detained in the numerous hollows and cavities formed by such degrees of pulverization, a larger proportion of oxygen may be supplied, which, by its union with the carbon and other inflammable materials that are mostly contained in soils, may produce the carbonic or other acids, according to the circumstances of the cases in greater abundance, and in this manner aid the growth of vegetables in a high degree. And as the water, or moisture that is included in large quantities in the pores of soils in such powdery states may undergo the process of decomposition more fully, by coming more minutely in contact with the portions of atmospheric air that are covered up and imprisoned with it in them, the supplies of ammonia or volatile alkali, by the combination of its hydrogen with azote, may be more regular and copious, as well as those of nitre, by the more complete union of its super-abundant oxygen with some other portion of the abounding nitrogen, or azote of such air. And it has likewise been suggested, that as the atmospheric air confits, or is constituted of oxygen, azote, and the fluid matter of heat, if the heat that causes them to exil uncombined in the form of gases be drawn away from them by some other material, while they are confined in the cavities of the soil, they may, by their nearer approach to each other, combine as to produce nitrous acid; or the oxygen, in its fluid state, not in its aerial one, may more readily unite with carbon, and thus constitute a fluid, not an aerial carbonic acid, which is supposed by some to be of great utility in promoting the growth of plants. And further, that if any process of the putrefactive kind be going on where atmospheric air is in this way confined in the interstices of the soil, and by the deprivation of its heat is converted from a gas to a fluid, the azote may combine with the hydrogen of the decomposing water, or contribute to decompose it, and in this manner form volatile alkali, which, like nitrous acid, may, either during the process of its formation, or after that has been completed, be of very material utility in promoting vegetation, while at the same time the oxygen afforded by the decomposing water may, like that of the atmosphere, contribute to the production of the carbonic, nitrous, or phosphoric acids; and in this way render carbon, phosphorus, and the basis of nitre, capable of being taken up by the abudant roots of growing plants. From the great diminution of bulk that has been found from experiment to take place where atmospheric air is confined in contact with water, it is conceived that there may be a decomposition of both the water and the air, and a production of both ammonia and nitrous acid, which are known to be beneficial in promoting vegetation, or the growth of plants. It is conceived that in these different views the practice of falling may in various instances be highly beneficial, notwithstanding the objections that have been so repeatedly brought against it by writers on husbandry; but at the same time it must be admitted that in some sorts of soil it will, for many reasons, be much more advantageous and useful than in others. On the lighter kinds of land, where full and luxuriant crops of different sorts of plants, as cabbages, turnips, potatoes, &c. may be grown, that produce a close, thick foliage, and which, as has been shown by experiment, afford under such circumstances much carbonic acid, which, from its being greatly heavier than the common air of the atmosphere, must fall upon and be mixed with the soil in such flagellated situations, and thus, together with the more conchiant moisture that must be present in such cases, promote the solution and decay of various vegetable matters, and continually add carbonaceous and other materials so as to greatly improve the soil; it can be seldom be necessary. Besides, as in these soils, by the use of the drill, and repeated hand or horse-hoeing during the growth of the crops, the ground may be kept perfectly clean from weeds, and in a line mellow or powdery state, without the danger of being injured by too much evaporation and exposure in the way of falling; and likewise in soils of the same nature, that are rich from the frequent applications of manure, and in which the processes by which the different nutritious substanences that have been described are formed and prepared, are properly going on, it must be injurious and improper to expose their surfaces frequently to the influence of the air, sun, and rain, as is the case in falling, as by such means the portion of carbonic acid that may exist in the state of a fluid may be made to assume the gaseous form, and be more readily dissipated, as also the phosphorus and the other materials in their different conditions before they form nitrous acid or ammonia. Thus, besides the injury that may be done in falling such sorts of land, by the carbon and other inflammable materials which they contain, combining with the oxygen of the surrounding atmosphere, and afterwards by their further union with other substances as to form insubficient compounds, such as phouched of lime and calcareous niter, as has been ingeniously suggested by lord Dundonald, there may be others of hot less consequence arising from the dilution and loss of the carbonic or nitrous acid, or of volatile alkali in the gaseous state, as shown by Dr. Darwin.

But that in all the wet bottomed, stiff, adhesive, and clayey sorts of soil, which constitute a large proportion of the lands of the kingdom, where, from the clofenes of their textures, and the great tenacity of their particles, but a very slight, or indeed scarcely any, degree of pulverization has been effected, the practice of naked summer falling may often be highly useful and advantageous, not only by the great mechanical alterations that must of necessity take place in them by the repeated ploughing or turning-up of their parts to the influence of the atmosphere, but by their admitting the particles of the manures that may afterwards be applied to be blended and incorporated with them in a more minute and extensive manner, and their becoming so perfectly aerated, as that the different processes that have been mentioned may take place and properly proceed, so as to form in them such substanences as have been found of utility in aiding the growth of crops; and which could not possibly have been produced without such pulverization as is the effect of falling in the naked method.

It may be further stated likewise, that the degree of friability and mellowness that is produced in this way in such soils has also other advantages, such as those of admitting the roots of the growing plants to penetrate them with greater facility, and presenting a more extensive surface for them to draw their nourishment from. And as in lands of these kinds there is a constant tendency to throw up abundant crops of root and other weeds, it is, perhaps, only by the frequent turning over of the soil and the tending of them up by harrowing, as is the case in summer falling, that they can be effectually eradicated and destroyed. It is principally in this view that the working of such soils in the early spring or summer months becomes so particularly necessary, as at the period in which the feed is to be put into the ground, neither the season nor the state of the weather...
tler will admit of their being sufficiently broken down and re-cultivated by ploughing, or the weeds to be destroyed. And it may be added, that wet lands, by being turned over during the winter season, are liable, in many cases, to become more stony and adhesive, by which the roots of the crops must be more limited and confined in their means of acquiring nourishment from them. It has been long well observed, that "when land of a dry gravelly quality gets foul, it may be easily cleaned without a plain summer fallow; as crops, such as turnips, &c. may be cultivated in its place, which, when drilled at proper intervals, admit of being ploughed between as often as necessary; whereas, wet soils, which are naturally unfit for carrying such crops, must be cleaned and brought into good order by frequent ploughings and harrowings during the summer months." Indeed it is frequently contended by the same writer, that the most judicious intermixture of crops upon clay soils will not prejudice the necessity of a summer fallow; though it is admitted that it may go a great way in preventing the necessity of its being so frequently repeated. But another writer, whose experience has been considerable, while he allows that there is no question at all of the merit of fallowing when compared with bad courses of crops, and who thinks, that if the husbandry is not correct in this respect, the fallow will certainly be a much better farmer than his neighbours, contends that there are couries which will clean the foul land as well as any summer fallow, by means of plants which admit all the tillage of such as fallow. "Cabbages," he says, "are not planted before June or July; winter tares admit of three months' tillage, if tillage be wanted. Beans, well cultivated, will preserve land clean, which has been cleaned by cabbages; and in any case two successive hewing crops are," he thinks, "effective in giving positive cleanliness. These observations are not," he adds, "theory; they are practice; and it is high time that mankind should be well perfused, that the right quantity of cattle and slurry cannot be kept on a farm, if the fallows of the old system are not made to contribute to their support. There are probably, however, many situations of clayey soils so exceedingly dry and wet, that though turnips, cabbage, or bean crops, may be grown upon them, it cannot, from the great labour and difficulty of their preparation, and the high degree of injury that must be done in the eating them or carrying them off the land, be to much advantage, or such as to admit of that sort of culture during their growth as will keep the ground perfectly clean from weeds. In such cases no course of cropping, however judicious, can possibly be effectual in this respect; it is indeed well known to such practical farmers as have had the management of soils of this nature, that it is scarcely possible to be effectual even by summer fallowing itself. It has also been fully observed, that soils of this description are so frequently, from necessity, ploughed over when wet, that an addition and foundnede are produced that cannot be removed without exposure to the heat of the summer's sun, and the pulverization afforded by the repeated operations of the plough and the harrow. There is no sort of crop that can in such a case have a chance of entering the soil, as they are not allowed to enter, or be drained, beans, though they may suffer in the way of an effluent to fallow, and have the tendency of keeping lands clean that are already in a proper condition, it is stipulated, from the necessity there is of fowing them early, can never be beneficially substituted for the radical improvement that is produced by a clean naked summer fallow. It is, however, added, that even if such sorts of land could be kept perfectly clean and free from weeds by the judicious interpolation of bean, cabbage, or other similar crops that might be cultivated on them, it is evident that the various beneficial products which have been mentioned, and which are the result, in a great measure, of the perfect pulverization and high degree of aeration that are produced by means of summer fallowing, could never be formed in such an abundant manner as to be of much utility in aiding the growth of crops; nor could they be in so suitable a condition for the admixture and extension of the abundant roots of the plants that may be cultivated upon them as crops. But though these circumstances may demonstrate the practice of fallowing to be occasionally necessary and highly useful on such wet, adhesive, clayey soils, as the proper and most advantageously quantity of flock for the improvement of such farms can seldom be kept where it greatly prevails, the repetition of the practice would, in this view, be nearly as much as possible, by the cultivation and growth of green crops as often as the lands may be in a state for them, and they can be had recourse to with any chance of success. The turnip, or Swedish turnip, as being a plant more adapted to wet, stiff soils, than either the common cabbage or turnip, might probably, in such soils, be advantageously substituted as a green crop, and by being eaten off in the latter spring months, when the ground became sufficiently dry to bear the cattle or sheep without injury, admit of a put crop; after which, the land would probably be in a suitable condition for wheat; or a crop of clover might be taken, and then wheat. But in all such crops much must depend upon the degree of cleanliness, pulverization and aeration, that has been accomplished by the occasional use of summer fallowing. And there is much variety in the conditions of such soils as may occasionally require the aid of naked or summer fallowing, in order to render them suitable for the growth of clean grain or other crops; some, from the nature of their situations and the fulf-foils on which they are placed, being more inclined to the retention of injurious moisture or wetness than others, consequently more disposed to be cold, and to the throwing up of large crops of weeds; while others, from the large proportion of clayey or stony loamy materials, that may be mixed and incorporated with the pebbly or other ingredients, may be more stiff and retentive, and of course more difficult or more incapable of sufficient pulverization, and of admitting the roots of such plants as are capable of being cultivated upon them, to readjust themselves, and draw from them proper supplies of nourishment. And besides the varieties of these different states, there may probably be others that have not hitherto been well ascertained or attended to, such as may proceed from the different uses in the qualities of the properties of the clay or loams as they enter into or exist in their composition, upon each of which a diversity in respect to the cleanliness, aeration, and of course, contributing the benefits of fallowing may depend. The correct former would, therefore, naturally keep them in view, whenever it may be necessary for him to prepare land by means of summer or naked fallowing. It is centredly contended by a host of writers that one great purpose of the fallow is to allow that of growing weeds which, in consequence of previous bad management, and of over-cropping, have increased to such a degree, as to render cultivation for grain no longer profitable. It being allowed to rest for a season from yoking a crop, and being repeatedly ploughed, the soil is supposed to have the influence of the different seasons, and at the same time to give it pulverization, its fertility is a perpetually renewed, by the application of a smaller portion of manure than would be otherwise necessary, it is rendered fit for the producing valuable crops of grain or grass. It is universally acknow-

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ledGED, that all soils, even those naturally the most fertile, are capable of being rendered unproductive by constant and severe cropping, and that the more improper the modes of cropping are, the sooner, and the more certainly, will a comparative barrenness ensue.

Hence the propriety of following, where imperfect modes of culture are adopted. Following, in what may be called the infancy of improvements in agriculture, is also, it is conceived, essentially necessary. If land be greatly exhausted, no matter by what sort of previous mismanagement, following is, it is supposed, the most expeditious, the most effectual, and every thing considered, the least expensive method that can be adopted for restoring its fertility, and rendering it productive. It is the most expeditious, because it is completely done in the course of one season, whereas several years of culture, and a great additional quantity of manure, would be requisite, were any other less effectual mode of tillage adopted. It is the most effectual, because the farmer has in it his power to destroy every weed, to turn over and expel the soil to the influence of the weather in the different seasons, and also to level and straighten the ridges, drain the land, and remove every obstruction to the introduction of better modes of husbandry, none of which could be so conveniently or effectually performed between the harvest of one year and the feed time of the next. Following is also, upon the whole, the least expensive method by which the fertility of land greatly exhausted can be restored, and the only one that can be adopted with a certainty of success, for the removal of every obstacle to the introduction of more perfect agriculture. Manure operates more powerfully when applied to a field that has been properly ploughed before following, than when laid on one that has been long under an improper course of cropping. The returns, after following, will be to a certain extent, and therefore, although the absolute expense of following is considerable, yet the crop that succeds is so much greater as to counter-balance that expense, while those that follow, if properly adapted to the soil, will yield the farmer a proper compensation for his extra trouble and expense. In the above statement it is observed, however, that the writer had chiefly in his eye the practice of following as recently adopted in the southern parts of Scotland, and the principles on which the farmers regulate their conduct, where new and better modes of culture became general.

It is remarked by an able writer, in the second volume of "Communications to the Board of Agriculture," that many farmers regard following as the greatest improvement that ever was introduced into the agricultural art; by others, it is either unknown, or is defined as an unnecessary waste of labour, and a sacrifice of the produce of the land. Much of the contrariety of opinions which prevails on this subject may, he thinks, be accounted for, from the quality of the soil on which the farmer operates, or from his local situation. Strong clays require a more frequent repetition of follow than those soils that are dry and friable, from containing a great proportion of sand. In those districts where excessive rains abound during summer, it is seldom convenient for the farmer to be encumbered with too great a proportion of follow, as it is often impossible to get it properly wrought, before the land is turned into a mine, if the finest parts of the soil be not washed away. In such situations green crops, adapted to the quality of the soil, are, in general, the most eligible mode of following. As in such districts pasturage ought to be the principal object, so this mode of following is calculated to provide for the wants of the live stock in winter as well as in summer. There is no soil or situation, it is supposed, where naked followings ought not to be rendered less frequently necessary, if not wholly superfluous, by adopting a proper rotation of crops. Were a drilled green or pulse crop interposed between every two corn crops, the land would always be kept clean and in fine tilth, and a much greater value would be extracted from the same quantity of manure. As the quality of the soil ought ever to be considered in deciding the species of follow for which it is best adapted, so the quality of the soil ought also to determine the mode by which the following ought to be conducted. Some soils ought always to be turned up before winter, that their parts may be split and pulverized by the frost: others should not be ploughed until spring, as excessive pulverization renders them liable to become mirey with rain, which chills the crop, and they condescend into a land mafs at the approach of drought. Thus it is more convenient to have such soils rather broken into small pieces than reduced to a fine powder; but where the object in view is a drilled crop, it is always advantageous to turn over the land before winter, or even to give it a stirring or two during that season, because working it in drills afterwards prevents the effects already flated.

For land already in cultivation, the great uses of follow are, it is conceived, to reduce or preserve the land in a state of fine tilth, to clean it of weeds, and, by turning it up to the air, to cause a more perfect putrefaction of the animal and vegetable matters it may contain. This last effect is so clearly ascertain'd, that the most experienced farmers have affur'd the writer, that land which has been repeatedly dragged has been found to yield a much better crop in consequence of a follow without dung than from a complete dose of dung without a follow; and this too after the productive power of the land had been much exhausted by cropping. But for land that is to be reclaimed from a natural state, or from a rude and imperfect state of cultivation, a follow is always indispensably necessary for various reasons, and particularly those of affording a convenient opportunity to level the inequalities, and to lay the land in the most proper form for future cultivation.

And it is stated by the intelligent authors of the "Agricultural Survey of the County of Northumberland," that the practice of making naked followings on all kinds of soils, once in three or four years, was general through that county, till the introduction of turnips; in a few years the followings of the dry-lands were covered with this valuable plant. On such other soils as were found improper for this root, the naked followings still prevail with an almost universal opinion that it is absolutely necessary to the fertility of the land; yet there are some few, they say, who dare to doubt this long established doctrine, and pronounce that naked followings might be dispensed with in many situations, by cultivating leguminous crops drilled at wide intervals, to admit being ploughed or harrowed between; to which, if proper hand-hoeings be added, the land will be as well prepared for wheat as if it had been a complete naked follow. This is not, they say, advanced on speculation or theory;instances can be produced where no naked followings have been made on fields of strong lean for twelve years, yet they are as clear of quickens, couch-grasfs, or other pernicious weeds as any fields in the district that have been under naked follow two or three times in the same period. It may, however, be necessary to observe, they think, that, previous to the adoption of this system, the land was cleared of quickens or couch-grasfs, by a complete follow. But though they are diffident in giving a decided opinion in respect to the necessity of followings, yet, from observations made on the above facts, they cannot help being inclined to think that the quantity of naked follow might be very much reduced, and in another century, they suppose,
will probably be totally abolished, if no fortuitous circumstances arise to check the exertion and spirit for improvement, which have been so prevalent of late years, and so generally diffused through that district.

In the Report of the County of Mid-Lothian in Scotland, it is stated, that fallowing is practiced there not so much as making part of a rotation, as from other circumstances, which render it sometimes necessary. Thus when lands are rendered foul, from the occurrence of a bad feaon, or barren, from too frequent repetition of exhausting crops, summer fallow is introduced as a corrective, and its effects are always satisfactory. On light or dry lands, however, it is seldom found necessary to fallow; for these can be got into good order for a crop of potatoes, or of barley, or of turnips; or even more early in the seazon for beans and peas, but heavy or wet lands are not so pliable; and although it is clearly possible to labour them also, without fallowing, yet it is found to be more profitable to have recourse from time to time to that expedient, and its operation is generally more effective and lasting on such soils, so that it is seldom necessary to be repeated oftener than once in seven years.

And it is asserted by the author of the "New Farmer's Calendar," that the practice of fallowing, the miserable substitute of former times for manure, and the hoe-culture, can be no longer necessary on any soils, under the present improved state of husbandry. In those parts where judicious cropping has been substituted to fallows, every species of product including the rental, has experienced a wonderful increase, to the certain emolument of all parties concerned, the landlord, the tenant, and the public. The same kind of land in all respects, whether rich or poor, has been proved, in numberless instances, equally, or more fruitful under contant crops than under the fallowing system, including those particular species of soil which it was pretended could never be successfully tilled without fallows. How often does it happen that, upon these very soils, an enlightened farmer shall be found cropping his lands according to the improved practice, and making larger crops of wheat than the surrounding fallowists; upon the self-fame fallow, parcel by the hedge, one man shall make an expense fallow for wheat, and gain two quarters and a half; his neighbour shall also obtain the same quantity of wheat, after a fallow crop of clover or carrots, the acreable profit of which shall far exceed that of the wheat itself; and his land shall be at the same time left in the best heart and cleanest tillth. The writer speaks of facts, which he has himself often witnessed; and were proofs necessary, he could fill his book with them, drawn from the most authentic records. The advocates for fallowing within his knowledge, and he has reason to believe in general, have contented themselves with mere affections of the superiorit of their practice, without ever once designing to make trial of any other, or with making only a few defective and ill-conducted experiments; after which they have again relapsed, unconvincing, unconvincing, and unimproved, into their old habits. By indolent men like these, and by landed gentlemen, who are so ill advised as to commit the management and the letting of their farms to persons totally ignorant of any principle of agriculture, is the vexatious and unprofitable system of fallowing perpetuated. There seems ever to have been a trifling deficiency both of solid argument and experimental proof for the necessity of fallows. The fallowists have, in his opinion, contented themselves with thinly affirming that their lands will not do without fall, and with excluding against innovation and new-fangled practice. If they have brought forth any arguments at all, those have been generally of that well-known class which men are wont to use in the service of a favourite hypothesis they have previously determined to support. It has, he conceives, been taken for granted, and with a confidence such a notion never merited, that the earth, like a system of animal organization, flails in need of rest, and that it may be totally exhausted by the action of perpetual vegetation; a notion which the earth herself, by her constant and invariable habits, has forced us to the trouble to refute. It may be very properly demanded of fallowists, how it happens that a defect of this singular kind should inhere in their lands exclusively? And why the poorest lands in foreign countries, as well as our own, should prosper under continual cropping? Whence arises the difference between their farms and their gardens? And why do the latter never stand in any need of resti, but produce exuberantly under perpetual feeding? They are well manured and well tilled. Should the garden culture be rejected as a parallel example, from its presumed superiority, he finds it entirely without reason; for the open field has the advantage, both in point of art, and even the possibility of superior tillage, from the improved implements and increased population of the present times. The earth is defi ned by nature to an everlasting round of vegetation, and whilst confined to her spontaneous exertions, requires no assistance from the hand of man. The seeds of these productions she poissesses in her own bowels, and the waste and fubsidance she has subsidized are amply returned to her in their falling and putrid remains, and in the rains, dew, and fat vapours of her atmosphere. Thus productions, maturity, corruption, and re-production, run on a necessary and everlasting circle. But if more be required than the earth would spontaneously produce, and the subsistence itself be withdrawn from the soil which produced it, an artificial amendment must be procured for the consequent exhaustion; hence the use of tillage and manure. This amend, however, being made to the necessary amount, the vegetable proceeds will go on unimpeded, and the land continues to produce forever, without demanding true or replete. Experiences of a date too ancient for chronology to ascertain have evinced the truth of this theory, on soils of every possible description. Land, then, of a quality however inferior, can never want to be fallowed under the idea of giving it rest, which will at the instant reject from spontaneig labour, to produce a crop of weeds; and as it must and will produce something, that something had surely better be such as will repay the expense of culture. But the truth is, that, excluding the idea of rest, the general facility of tillage is so defective, and the operation of that most useful and necessary implement the hoe, so much neglected, that in the course of two or three crops the farmer finds himself totally at a stand. He has been painfully and foolishly cultivating weeds as well as corn; the farmer has so far occupied and exhausted his land, as no longer to leave it free for nourishment for a crop of corn, sufficient to defray the attendant expense, exclusive of all expectation of profit. He must, indeed, in this case, have recourse to a follow, as the only method now left to extinguish a part of the weeds, that he may again crop his land; and this measure is at the expense of a year's rent, taxes, and labour, to fall as a surcharge in the product of the succeeding crops. That such surcharge is totally thrown away, and a positive loss to all parties, is, he contends, irrefragibly proved by the new practice; and if a landlord should suppose that he fans his lands by making a covenant for follows, he also ought to take into the account that, unless he permits the new practice, he can have no title to expect a new rent.

After lapsing the following hints and observations, which
which are contained in the Agricultural Reports of Staffordshire and Kent, to be erroneous, namely, that "fallowing for wheat, on cold, wet, or strong lands, and on all such as are unfit for turnips, is absolutely necessary; and that he who shall attempt to manage such land without falling will have occasion to repent his mistake," and that as "the mixed fallow, now in question, which are too moist for turnips, have a particular propensity to the protection of the root-grasses, furrow falling becomes absolutely necessary, and every attempt to crop without it, for any length of time, on such land, has terminated to the injury of the land, and the loss of the occupier;" the writer contends, that, if these farmers will be at the pains to search out of their own counties, they may find numerous practical refutations of the above doctrines, in the very converse of which he really believes the truth to reside. He has never offered couch to be eradicated by falling; a portion only is destroyed, and a sufficient quantity of roots left to produce a crop, which will speedily demand another fallow, and so on for ever. Regular periodical falls may, in truth, he thinks, be followed the unevenness and hot-beds of couch, since, on lands subject to the practice, we have the greatest quantity of it. Not that he entirely agrees with the too languid advocates of the hoe, that it will, of itself, entirely root out couch-grass; but that, such would be a long and tedious method, at which, he said, even Tull himself hesitated. Nevertheless, after a good dragging, and burning the roots, during a month or two of dry weather, to the hoe only we must look for their gradual and total extinction; and this method he has never known to fail in the worst possible cases of couch, colts-foot, and other similar kinds; with the reserve, however, that the lands must never be withdrawn from the hoe culture, whatever be the crop, until the enemy appear to be totally extinct, which will seldom be delayed beyond the third year. It seems singular to admit that falling may be superceded by tarring, and yet not by cabbages and beans, the appropriate hoe-crops of strong lands; surely the latter will bear constant tilage, at least equally well with the light and weak. But whilst he contends that the earth requires no rest, but labor exercised and good nourishment, he would not thence be understood that the derives no benefit from rest; all experience declares the contrary; her spontaneous growth being returned to her before, this also bid open by tillage to the absorption of the rain-water, both by the soil, and by the crop; but this is so nourished and restored. All intended to be proved is, that the price is infinitely too high for the benefit received, and which, in truth, to its fullest extent, may be otherwise obtained gratis, and even with a premium annexed. Nor is he at all prepared to say, that those styled ameliorating crops, whether carrots, turnips, cabbages, grasses, or what not, are such, in the simple and restricted sense of the word; that they are really the vehicles of nourishment to the earth, like a fallow, or that the putrid fermentation occasioned by their shade enriches, since, if it really have that effect, themselves are extracting the benefit of it. No, all vegetable productions carried off the land, although not in equal degrees, detract, he contends, from the strength of the soil, which may be impoverished by the fythe as well as the sickle; yet grasses rarely exhausts it the least. Those plants abounding most in vegetable gluten, in weight and substance, are the greatest exchaners; at the head of them, undoubtedly, wheat ought to be placed; potatoes, perhaps, next. Crops, then, can only be said to be ameliorating, on the score of their being hoed, and of a considerabe part of their produce being returned to the land, in the dung of the animals which they feed. Omit the hoe, and fell the crop, and, instead of amelioration you would soon, he thinks, find galloping consumption; and then, if in want of a convenient phrase, you might say your land was tired of such or such a crop. Even the belt tillage under the fallow-system, he supposes, lands self-convicted of deficiency, since it needs the irrevocable repetition of that expensive aid; it evinces a defect of crops for the support of cattle, of consequence a defect of manure and of hoe-tillage. If the fowing of white corn by broad-cast must be perfilled in, there is no possibility of keeping the land clean (generally speaking) but by the intermingling, in due course, of pulse-crops which are hoed; with the aid of which, and a strict attention to hand-hoing and weeding the broad-cast corn, the necessity of falling will be for ever precluded. It will be understood, that a farmer's repast is necessary at first, in order to clear the soil of rant-weeds; and afterwards, the usual intervals between the crops, the weather being dry, will afford opportunities of again using the drag, or cultivator, to the same end. These occasions always being diligently laid hold of, the roots will soon be totally destroyed. As to the feed-weeds, contrary to the common custom of farmers, those ought to be encouraged by all possible means of pulverization, to make their appearance, that they may be drawn or cut off previous to their bloom. Various circumstances in tillage may induce the necessity of an occasional winter fallow, which, by the land being laid up clean, will always be beneficial. It is, on the whole, concluded, by the practical author of "Modern Agriculture," that the practice of falling may, no doubt, be adopted with propriety in some cases, while a lasting adherence to it in every instance would be highly improper.

In respect to the manner of performing the proceeds or operation of falling, it should always, like most other processes in husbandry, be conducted with a due attention to the circumstances and qualities of the soil, as more pulverization or breaking down will evidently be required where the land approaches to the nature of a perfect clay, than when it has more of the loamy quality, and where the retention of moisture is considerable, more regard will be necessary to the destruction of weeds, than where there is a greater tendency to dryness. In most cases where the practice of naked falling is thought necessary to be performed, the most general method of proceeding is, for the land to be ploughed up in the autumn, a second time after the barley, feed leasen is finished, and two or three times, or often, afterwards, as circumstances may render necessary; the ground being well broken and reduced by means of harrowing in the intervals of the different ploughings. But it has been observed, that "in many districts seldom more than three ploughings are given to lands in a course of summer fallow: one in autumn, or early in the spring; another during the summer; and afterwards the feed-furrow." This preparation appears, however, it is further contended, extremely defective; as in an ordinary feaion it is fearfully possible that with so few ploughings either the root or feed weeds can be completely destroyed; and when the summer happens to be wet or rainy, the lands under such management must certainly be in a very bad state for receiving the feed-corn. It has likewise been long since judiciously recommended, both in the preparation of lands by winter falling, for barley crops, and summer falling for those of wheat, that when it is first ploughed up after the harvest is over, (which should always be done as deep as possible) no time should be lost in rendering the new-turned-up soil as fine as possible by harrowing; as repeated trials and attentive observation have fully shown, that such lands as are made fine before the sharp frosts and winter rains come on.
receive a much larger share of their influence than any others. But that if the land be left in a rough state, there is seldom time for the rains and frosts to penetrate or affect more than merely the outside of the large clods or lumps that are present. The outside may thus, indeed, be pulverized, or broken down, but the middle of the clumps, wherever they are large, are found nearly in the same hard stiff state, as when turned up by the plough. Hence it is evident, that the benefit of the air, winter rains, and frosts, on lands thus left, must be only partial; and that of course the harrowing it in the spring, especially when the latter of these is over, is too late for its receiving the full benefits which might otherwise have accrued from them, and the power of promoting a vegetation not being nearly so great. Therefore, to make winter fallsows s fine as possible in autumn, and ridge them up in that pulverized state, is acting most agreeably to nature; the greatest possible quantity of surface being thereby exposed to the atmosphere, and the land left in the state wherein the rains and the frosts are most easily admisible; they are consequently more capable of penetrating and enriching the whole mafs to a much greater extent. By this means, too, a larger proportion of atmospheric air is involved and incorporated with the mould, and of course a more perfect degree of aeration effected. It is contended, that it has been invariably found, that the frosts penetrate a quantity of earth, formed into a large hard clod, only partially, on account of its bulk and hardness, and that the same clod broken into four parts would be thereby penetrated four times as much, or, in other words, that four times the quantity of earth would be affected, and on a thaw be pulverized by it; for it is always found, after the breaking up of a severe frost, that all the small clods crumble easily into powder, while the large ones are only slightly reduced by the crumbling off of a portion of their external surfaces. It is conjectured, that there cannot be much doubt but that by reducing such stiff, adhesive soils, as require falling well, on their being ploughed up, great advantages in the way of pulverization may be accomplished, as in the spring and summer months they are apt to cake, and become so hard and lumpy as to be wrought with difficulty. But in order fully to ascertain the utility of this method of preparing fallows, one half of a field of ten acres was left as nearly of an equal quality as possible, in the rough state after ploughing; while the other was made very fine, by harrowing and beating in pieces any large hard clods which the harrows could not reduce. In the following spring it was observed, that that part which had been harrowed was much finer without any additional working, than the other could be rendered by repeated harrowings. It is consequently concluded, that upon moist soils of loamy clayey soils, where fallowing becomes necessary, the first ploughings should be given, if possible, before the commencement of the winter season, and that they should also be well reduced by means of harrowing, in order to promote the decomposition of the vegetable matters as may be upon the surface of the land, as well as to promote a more complete state of pulverization and aeration of the soil at the time. This is often most usefully performed by gathering up the ridges, as in that way the ground is not only laid more dry, but the furrows more effectually opened for the draining off of the injurious moisture.

In the second ploughing in the spring, which is generally before the cross-ploughing is given, these ridges ought to be clowed or turned back again, and after lying a sufficient length of time, be well harrowed down for several times, and occasionally rolled, that sufficient opportunity may be given to collect and remove every sort of weed that may be brought up to the surface of the ground. After this, the furrows shall be well harrowed down by means of the plough, by which it is rendered less affected by wetness, and the portions of soil that had not been touched in the cross-ploughing filled. In this way a perfectly clean fallow may soon be produced in moist fields. It has, however, been maintained by some writers who have had much opportunity of examining the matter, that ploughing only is necessary; the collecting the roots of the weeds and removing them being useless and improper. But in the flatter fields of clayey, wet soils, where we have conceived the following fallow to be chiefly occasionally necessary, it is almost impossible to get perfectly clear of different sorts of root weeds in this way, from the coddle manner in which such lands break up in the operation of the different ploughings, the earthly lumps often containing many that are not in the least degree injured in their power of taking root, by the heat to which they have been exposed under such ploughings of the land.

In these cases, they can only perhaps be effectually eradicated and destroyed, by the high degree of pulverization that may be accomplished by means of frequent harrowings and rollings; the weeds being afterwards carefully removed by the hand. In this way there may also frequently be a considerable saving of expense by the levelling of the number of ploughings. The frost in the winter months has also, as has been seen, a much more powerful action where such reductions in the clods of such soils have been effected. In such fields there can seldom be any danger of their being made too fine by operations of this nature, as the feed harrow, when given sufficiently deep, constantly leaves the land lumpy and irregular enough for the purposes of covering the grain, and protecting the young plants during the severity of the winter season. The benefits of alfalfa being as high a degree of pulverization or fineness as possible in the land, in the management of this process, has been fully shown by the results of many well-conducted experiments. The produce of a field of barley and broad clover, one half of which had been prepared in the most perfect mode of fallowing, and the other half in the common method, on being harvested and kept separate, was in the following proportions; that which had been conducted in the latter way only amounting twenty-four bushels to the acre, while the former yielded thirty-one, and the grain considerably better in quality.

There was also an equal superiority in the clover crop the succeeding year; that on the most perfectly-prepared part being heavier by nearly half a ton of the acre. In addition to this, it cannot have escaped observation, that in large fields of wheat, where, from accident or other causes, some portions of them have received more frequent ploughings than others, that in these parts the crops generally appear, for a great length of time, more perfect and promising than on the other parts.

Another mode of performing this process, which has lately been practised in some places, which is to plough the land over with a deep, broad, clean furrow, in a danger season in the autumnal months, leaving it in this state till the early spring, when, immediately after the fall period, it should be harrowed down as fine as it can be made, clearing off all the couch and other refuse matters at the same time, and continuing them by fire. Then ploughing the land in exactly the same direction back again, breaking the root weeds as little as possible; after which letting it be well harrowed over again in the lengthways of the ridges, as cropping them would be injurious; collecting and burning the whole of the refuse materials as before. In this latter condition of the soil, a powerful cultivator or learding
be immediately passed in the cross direction of the ridges and furrows to the full depth of the plough, by which means the roots of the couch and other weeds will in a great measure be drawn out at length, without being much broken, and the lumpy parts be brought to the surface to be reduced by the action of the harrows afterwards. When not sufficiently broken down and cleared by these operations, the scarifer and harrows must be again had recourse to as before; and when the root-weeds have been collected and burnt, any clods that may remain on the surface may be fully reduced by rolling, and afterwards another harrowing.

In this way it is found that in the foulest lands a perfectly clean fallow may be made. In the execution of the buffels, however, much depends upon the work being performed when the land is in a proper dry condition, as when wet it cannot be done to advantage. The harrowing should be so managed as to have the refuse weedy matters in such a situation as not to prevent the whole of the land from being operated upon, and as well as the scarifying be executed as soon as possible after it is left light by the second ploughing. The scarifer, though an excellent tool for this purpose, cannot indeed perform its work properly, except when the soil is in this loose state of mould. Where this implement is to be used, there should never be any crows ploughing made, as that renders it incapable of performing its work in the most effectual manner. And where the land is inclined to the retention of moisture, it should be well drained to prevent the stagnation of water upon it, as it would thereby be greatly injured during the winter season.

By this method of preparing a fallow, the soil is reduced into a fine state of stam, and rendered perfectly free from weeds, without having its parts so much exposed to the influence of the atmosphere as to rob it of a large portion of its fertility.

In Essex, and many other districts where the soils are very stilt and heavy, it is usual to plough the fallow lands over a great number of times, frequently even eight or ten, in different directions, in order that they may be rendered perfectly clean and stam. In some cases the first ploughing is given deep before Christmas, then two clean crows ploughings early in the spring; after this the land is ploughed up into ridges or furrows of various breadth, according to circumstances, then split out again, and lastly ploughed back for the seed furrows; different harrowings being practised in the times between the several ploughings.

In the second volume of "Communications to the Board of Agriculture," Mr. Headrick speaks of a mode of following by drills, invented by Mr. John M'Kenzie of Glasgow, which, he says, is certainly the best of any yet attempted by the plough, either for levelling cold-bottomed ridges, or for pulverizing ribbony clay-soils already in a level state; but it requires considerable dexterity in the ploughman.

In performing this operation, the water furrows, he observes, are first gone round, and ploughed in on each side, so as to form a drill, when the third fur-row from the rut thus made, on each side is raised, and thrown upon the second: this a skilful ploughman can do by his eye with great exactness; but if he cannot trust his eye, he may have a crofs fform nailed on the beam of his plough to mark out the distance from the former rut at which a fline ought to be raised. As the plough only flirs a third of the land by this first operation, it may go over about three acres in one day, laying it all dry, and in a condition to be followed ever after, in the wettest weather that cattle can work, without any danger of ploaching. After the land is thus marked out, the cattle ever after walk in the ruts between the drills, and hence their feet never pock the flurred land. We have then, says he, got the third fur-row, from the rut at which the opera- tion commenced, raised and laid upon the second, while the third and second remain unflurred, and the first is also un-covered. The plough, in its second passage, throws the fur-row upon the back of the third, previously laid upon the top of the second. This converts all the land into red earth, and the third passage of the plough flirs the remaining second fur-row, with the third that rests upon it throwing them in the same direction. Thus all the land is flurred, and assumes the appearance of three-furred drills, the equality and neatness of which depend much upon the accuracy of the fur-row operation in marking them out. The land may now be wrought either backwards or forwards, as may be necessary; to bring it to a complete level, the horses all the while walking in the bottoms of the ruts between the drills.

The figure annexed, in Plate Agriculture, Fallowing, is the section of a ridge to be levelled, or, if the land be already level, it is a bout or stritch of land that has undergone the first operation of drill fallow. If it be a ridge, the water furrows, a, a, are first ploughed in, so as to form single bout drills; then the third fur-row from the rut on each side is raised by the plough, and laid upon the second, and this is continued until the whole ridge or stritch is marked out. This lays the land perfectly dry, having a rut at every third fur-row. Figure No. 2 is the same land, after being twice gone through with the plough. In this second operation the fur-row, No. 4, is flurred, and all the land becomes red earth; because, though No. 2 yet remains unflurred, it was previously covered by No. 3. Figure No. 3 is the same land after the third ploughing. In this No. 2 is flurred, and the whole soil is now moved by the plough. The land now assumes the appearance of three flurred drills. If it be now level, the drills may be reduced by a brake-harrow, and marked out again in some other direction, so as to have the effect of crows-ploughing; only the direction must be such, that the water may be discharched from them. In this way the land may be ploughed in various directions, and wrought in drills during the whole course of a fallow. This mode of fallow, it is observed, causes a violent vegetation of weeds, because, by exposing more surface to the air, it brings more of their parts within that distance from the atmospheric influence, where their vegetation commences. By correring only one fur-row out of three at a time, every fur-row has full opportunity of mellowing by the influence of the sun and air before another is thrown upon its back; it also renders the fallow wholly independent of excessive rains; which often render following impracticable. When the land is brought to a perfect level, the weeds should be destroyed by a strong brake-harrow dragged across the drills. This will reduce the land to a smooth surface, in which state it may be allowed to remain until more weeds spring up; but if excessive rains should dislease the land in this state, a plough can be sent through to mark out new drills as before, which will render the whole dry. In fallowing, he says, crows-ploughing is essentially requisite to cut the roots of weeds in an opposite direction, and to prevent new surfaces of the soil to the air. Now, by this mode of fallow, crows-ploughing can be effected with greater advantage by drills crossing the former, and marked out after the land is laid smooth by the brake: such drills should always be so drawn as to discharge the water. Thus a field may be ploughed in several different directions, always keeping it in drills, and remain, independent of the weather. After land is crows-ploughed in the ordinary way, it often happens that excessive rains render it a perfect mire,
mire, and it is frequently unworkable during that season. In the fallow by drills, this, the writer thinks, can have no place; and should the weather be too wet, at the time it comes to be ridged, to admit of smoothing the drills, the ridges can be formed of a certain number of drills thrown together. In executing this mode of fallow, care should be taken always to make the furrows clean, so that no clods or earth may fall back and cause water to stagnate in the ruts. When very high ridges are suddenly levelled by this mode of fallow, it is obvious that the good soil will be buried down, as happens in every mode of levelling with the plough; but the fresh soil that is turned up, being brought into circulation within the influence of the atmosphere and always worked in drills, is much sooner melliorated than by the method of close ploughing. If, however, the ridges be very high, it is safest to split and reduce them considerably in the course of cropping, previous to their being effectually levelled. When levelling at left commences, it is proper to get through as much of it as possible before winter, that the new soil which is turned up may receive the benefit of the frost. With these precautions high ridges levelled by a drill fallow will discover no inequality in their subsequent fertility. It is hardly necessary to observe, that in all modes of levelling high ridges the old water furrows should be raised somewhat higher than the old crowns of the ridges; as the soil in the former, being very loose, subsides, and if not in sufficient quantity would again become a hollow.

It is further remarked, that, in many parts of the Lothians, they have a practice somewhat similar to this mode of fallow, of rubbing the land that is intended for barley before winter sets in. This is done by laying one fur-flice upon another, which remains unjured, and it divides the whole land into very narrow drills. These keep it perfectly dry during winter, and admit the frost to the bottom of the soil. On clay lands, and such as have a cold bottom, this is found to be very beneficial, for barley does not thrive on such soils unless they be finely pulverized in the mould.

This mode of fallow is probably best adapted to the bringing of such lands as have been in the flate of wattle into a condition fit for the growth of grain crops. When dung is applied on the fallows, it is generally laid on, Mr. Donaldson says, about the end of August, immediately after the fall ploughing has been given; but in many cafes, where the soil is naturally good, it is forbore till the second raising crop, as it is found that the first crop is in danger of being too rank, and of course lodged before it is ripe, if the land be duged the same year that it is in summer fallow.

It has been remarked, that though the advantages that have been rated to arise from the perfect pulverization, aeration, and cleanliness, occasioned by summer fallowing in those soils where it has been found to be occasionally requisite, can seldom be fully obtained by other methods of cultivation: yet as that method is constantly attended with a heavy expense to the farmer, and as the lowest of the benefits that are produced by it may be effected by the repeated partial fallowings that must occur in the hoe culture of different sorts of crops, it should be constantly the aim of the farmer, where the climate will admit of it, to lessen the necessity of summer fallowing even on the wet claye as well as the light kinds of soil, by the judicious interpolation of such sorts of clofe, thick, green crops, as can be grown and cultivated on them under the hoe system. This is still more necessary, on account of the lots that must be fallowed from the land often remaining such a great length of time totally unproductive where the fallowing process is going on. It cannot, indeed, be disputed, but that the practice of summer fallowing may be greatly levveden in many districts by the proper substituting of green fallows, or what are termed fallow crops, such as beans, peas, cabbages, turnips, and rape for the heavier sorts of land; and buck wheats, potatoes, and turnips, for such as are of the lighter kind. It is likewise maintained as a fact, that where large and luxuriant crops of these preparatory kinds are grown, those by which they are succeeded the following season are for the most part still larger, so that the lands are more improved by large crops then such as are poor. This amendment or increase of fertility has been attributed to different causes: as the prevention of evaporation from the soil by the shade produced by such large crops; the purification of the various vegetable matters, which may be more abundant after such large crops, taking place more completely and more effectually under such circumstances; and lastly, to the repeated pulverization and aeration that are produced by the different hovers; but it is probable that advantages may be derived in each of these ways, as well as from the carbonic acid or fixed air that is afforded by the shaded leaves of the plants being deposited upon or united with the soil. That the molleration in such cafes must depend on causes of this kind there can be little doubt, as much of the nutritive properties of the land must obviously have been consumed during the growth of such crops, which must have been again reflected to it by some such processes. But in whatever manner this effect may be produced, as it is constantly found that land is in a better condition, and when turned up in a more friable and mellow state after such crops as are large, than those that are poor and light; it is of course evident, that if ground can be covered with multering crops of the fallow kind, or those that will admit of frequent pulverization by means of the plough or hoe, so as to keep it clean and free from the growth of weeds plants, it may be more beneficial to the farmer, not only for the sake of the immediate crop, but also on account of the increase of manure produced by such means, and the advantageous condition of the land for the reception of such crops as may be afterwards cultivated upon it. In these different views, as well as those that have been already mentioned, the introduction of green crops of some fort or other should probably be more frequently attempted on all descriptions of soils; and it would seem probable, that on the stiff and heavy kinds of land, from its having been found, that in many well-cultivated districts, by the growing of proper leguminous crops in drills or rows, so as to admit of the ground between them being frequently firred, either by means of the plough or the hoe, such kinds of land, after they have been once well cleared by a summer fallow, may be kept perfectly clean and in invitable tith for the production of good grain crops; they may be much more generally had recourse to than has commonly been the case: but on such sorts of land great attention is necessary to introduce such kinds of green crops as are adapted to them, and that as little injury as possible be done by the trampling of animals in the feeding them upon or taking them from the ground. But as neither the full effects of pulverization or aeration, nor the complete destruction of weed seed, can in some cafes be so perfectly obtained by the cultivation of fallow crops as by the making of naked summer fallows, it may be advantageous to the farmer to have recourse to an occasionally with these intentions on the heavy and more wet sorts of land, as well as those that have been injured by improper methods of cropping, as is frequently the case in particular districts.

Yet though fallowing may be useful and necessary in altering the textures of particular kinds or qualities of soils, there are numerous facts that shew, in the most clear and satisfactory
FAL

satisfactory manner, that great injury and disadvantage are often the result of exposing land in its naked state too much to the action of light and heat, as happens in the fallow
p TOD, and which can only be avoided by having recourse
to sheltering crops of the green kind.

FAL.UM, in fame of our Law Lexicographers, is said
to be a sort of land; and for proof of this, they quote
the Monument Anglicanum. "De duabus acris et vigniti
fallis in, &c." Jacob. But from this passage it would rather
seem that fallum signified a measure of land as well as
area. And to this day a fall is a measure of length in Scot-
land.

FALMOUTH, in Geography, a market and sea-port
town in the hundred of Kerrier, and county of Cornwall,
England, is seated beneath a high hill, on the southern
shore of a harbour, which has long been noted for the safe
accommodation it affords to shipping in tempestuous weather,
having sufficient depth to contain the largest vessels, and be-
ing defended by the two castles of Pendennis, and St. Maw's.
About two centuries past, Falmouth consisted of only a few
fishing huts, till increasing in population it was known as
the village of St. Mawes, but it did not acquire its present
name till the restoration, when the king issued a proclamation
that it should, after the 20th of August 1662, be called
by the name of Falmouth, and granted it a charter of incor-
poration in the following year, by the description of "our
town of Falmouth." By this charter the government was
vested in a mayor, aldermen and burgesses; and the privi-
leges of a market and two fairs were granted. The new
town gradually extended: in 1664, the houses amounted
to two hundred; in 1669 they were three hundred and fifty;
and in 1801 they were returned as four hundred and sixty-
four, inhabited by three thousand five hundred and eighty-
four persons, included within the boundaries of the town.
Previous to the year 1664, Falmouth was part of the chapels
of Budock and parish of Gluvias; but was, by an act
passed in that year, separated and made a distinct parish.
Such were the origin and growth of Falmouth. Its im-
provement and progress during the last century have, in a
considerable degree, been connected with the establishment
of the packet-boats here for Spain, Portugal, and the
West Indies. From the facilities these vessels have afforded
to the merchants, of transporting their respective commodi-
ties, and receiving returns in a short time, the commerce of
the town has very much increased; and it is now the re-
dence of many opulent families. The houses are principal-
ly disposed in one street, nearly a mile in length, and run-
ing by the side of the beach. The quay is exceedingly
convenient, as the water will admit vessels of considerable
burthen to land their goods upon the wharf. The custom-
house and post-office for most of the Cornish towns are es-
lablished at Falmouth. Great quantities of gold, both in
specie and in bars, are brought into this port by the packets
from Spain and Portugal. The pilchard trade has likewise
been a source of much emolument. Falmouth is situated
273 miles S. W. from London: has good markets on Tues-
days, Thursdays, and Saturdays; and two annual fairs. At
the extremity of the town stands Arwinyack house,
the ancient mansion of the Killegrew family.

On the western side of Falmouth harbour Pendennis castle
occupies the brow of a hill, which forms a peninsula be-
 tween the British channel and this harbour, and appears to
rise from the bay like an island. The fortres is proudly
exalted on a rock upwards of three hundred feet above
the sea, and, from its elevated situation, has a complete com-
mand over the entrance to the bay. The fortifications are
of an irregular shape, including an area rather more than
three acres. On the north, or land front, the hill is defend-
ed by four cavaliers, mounted with heavy pieces of cannon,
in excellent order, and at a short distance are some traces
of a horn and crown work, which was constructed in the time
of Oliver Cromwell. The banks and ditch of the citadel
still remain, the situation of which was admirably calcu-
lated to protect the castle from the approach of an enemy over
the isthmus. On the exit face is an half-moon battery;
and close to the water's edge another battery of five guns,
called the Crab quay. On the south the hill slopes to the
sea, and forms a kind of natural glasses. Within the works
are barracks for troops, and various stores-houses and maga-
nizes; and in the south part of the peninsula stands the old
castle, built in the reign of Henry VIII. It consists
wholly of granite, and over the door-way are the arms of
that monarch. The works were afterwards strengthened
and enlarged by queen Elizabeth, but have undergone
many alterations and repairs of late years.

On the easterly side of Falmouth harbour is St. Maw's
castle, opposite to Pendennis, to which it is very inferior,
both in size and situation, though erected nearly at the
same time, and by the same monarch. The works are
completely commanded by a hill, which rises immediately
behind it. The adjoining hamlet, housted with the appellation
of Borough town, and represented by two members, consists of scarcely twenty huts, inhabited
only by a few fishermen; and has neither church, chapel, or meeting-house. The chief配上就是在
the portico, which is complimented with the title of mayor.
Polwicke's History, &c. of Cornwall, 41o.

FALMOUTH Harbour, on the south coast of Cornwall,
isa considerable extent of creeks and inland waters, forming
a safe harbour for ships of the royal navy, and others,
the farthest of any in England towards the south-west. The
towns of Falmouth, Penryn, Trichian-bridge, Truro,
Tregony, St. Maw's, and others, are situate near to these
waters. The easterly side of the main harbour is deep and
commodious for large ships, which go up as far as Kew:
the western branches to Carnan and Myler-bridge are shel-
low, and only navigable for luggers. The Falmouth tran-
smar road connects with this harbour at Reitonguet and
at Pen.

FALMOUTH Trans Road, in Cornwall, is one of those
branches of inland communications which have been carried
into effect since our general account of these important
establishments were presented to our readers in the article
Canal. It was constructed without an act of parliament,
in the year 1826, at the expense of Messrs. Fox and Co.;
Vivian and Co.; Ralph Allen Daniel, ed. and others, ac-
cording to a survey made by Mr. Mof, an engineer. This
trans-road has a course of nearly ten miles, almost in a N.W.
direction: it commences at two points, viz. the Pile and Re-
Fong: a shipping wharf, in Falmouth harbour, (above,) and
proceeds by a regular inclination, (deep, inclined planes
being unnecessary,) to the copper-mines, near Camborne,
to which it has a recent trans-road which has also been
extracted from Fortisbin harbour on the north coast of the
county. The hilly land with which this coast abounds is now,
by the trans-road, carried cheaply up into the interior of the
county, by which the agriculture thereof cannot fail of
being much improved, as well as the mines, which thus re-
ceive coals to work their beam-engines, and land down their
ore for exportation to the coal districts of South Wales,
which is imported and manufactured.

FALMOUTH, a township of America, formerly including
Portland county, in Cumberland county, Maine, con-
taining 3422 inhabitants. It is situated on Casco bay, 120 miles
N. N. E.
N.N.E. of Boston, and was incorporated in 1718.—Allo, a township in Hants county, Nova Scotia; situated on the S.E. side of the basin of Minas, opposite to Windsor, 28 miles N. W. of Halifax.—Allo, a maritime port-town, in Barnstable county, Massachusetts; situated on the N.E. part of the Vineyard Sound, on the west side of the bay of its name; 77 miles S.E. by s. of Boston. About 60 vessels are employed in this town, some as fishing vessels, others coasters, and more than 50 for carrying lumber to the southern states, and West India islands. It was incorporated in 1686, and contains 1882 inhabitants. N. lat. 41° 33'. W. long. 70° 35'.—Allo, a port-town in Stafford county, Virginia, situated on the north bank of Rappahanock river, almost opposite to Frederickburg. It contains an episcopal church, and about 40 compact houses; 23 miles S.W. of Dumfries, and 207 south-westly of Philadelphia. Considerable quantities of tobacco are inspected here.—Allo, a town in Lancaster county, Pennsylvania, on the S.E. side of Conaway creek, 20 miles westerly of Lancaster.—Allo, a town and harbour on the south shore of the island of Antigua; having English harbour on the E., and Rendezvous bay on the W., and situated in St. Paul's parish, at the N.W. corner of the harbour, which is well fortified. N. lat. 17° 9'. W. long. 61° 28'.—Allo, a town of Jamaica, more commonly called the "Point;" situated on the S. side of Martha's-vineyard harbour, and including the adjoining villages of Martha's-vineyard and the Rock, and containing 220 houses. This town and its vicinity have been wonderfully increased; for in 1771 the three villages of Martha's-vineyard, Falmouth, and the Rock, contained together but 18 houses, and the vessels which entered annually at the port of Falmouth did not exceed ten. It has fine shoals of upwards of 50 capital stationed ships, which load for Great Britain, exclusively of floats and smaller craft. N. lat. 18° 31'. W. long. 77° 31'.—Allo, a small low island in the Chineese fea. N. lat. 11°. E. long. 112° 12'.

Falonicchi, or Filanix, a large town towards the eastern coast of the island of Majorca, containing near 6000 inhabitants, in which the monks of St. Augustine have built a handsome monastery: the land about it is rich and fertile. The inhabitants procure more corn than is sufficient for their own consumption, and have, besides, large herds of cattle, and furnish the island with excellent brandy.

Falour, a town of Hindoostan, in Lahore; 50 miles E.S.E. of Sultanpore.

Fal'sa Quinta, Ital. in Mytce, falsc 5th. See Semi-diapente.

False Ribs, in Anatomy, are the five inferior ones on each side, and are distinguished from the true ribs by not having their cartilages articulated to the sternum. See Trunks.

False Bay, in Geography, a bay to the east of the Cape of Good Hope, and frequented by ships during the prevalence of N. W. winds, which begin to blow in May, and make it dangerous to lie in Table bay. S. lat. 34° 10'. E. long. 18° 30'.—Allo, a bay on the west coast of the northernmost island of New Zealand. S. lat. 36° 33'. W. long. 185° 38'.

False Cape, or Falso, the E. point of False bay, E. of the Cape of Good Hope. S. lat. 34° 10'. E. long. 18° 44'.—Allo, a cape, called False Point, on the E. coast of Hindoostan, at the mouth of the river Mahandra. N. lat. 20° 20'. E. long. 86° 48'.—Allo, a cape on the S. coast of Hispaniola, a little W. of Cape Beata.—Allo, a cape on the coast of Yucatan, in the bay of Honduras. N. lat. 20° 52'. W. long. 87° 45'.

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False Cape Horn, the south-western point of Terra del Fuego.

False Island, an island in the bay of Bengal, near the coast of Ava. N. lat. 18°. E. long. 94° 15'.

False River, one of the mouths of the Ava.

False Alarm, in War. See Alarm.

False Arms, in Heraldry, are those wherein the fundamental rules of the art are not observed: as if metal be put on metal, or colour on colour. See Arms.

False Attack, in War. See Attack, False.

False Brace, in Fortification. See Falssebrace.

False Claim, in the Forrest Laws, is where a man claims more than his due, and is amerced or punished for the same.

False Concepcion. See Concepcion.

False Flower, a flower which does not seem to produce any fruit, as those of a hazel, mulberry-tree, &c.

A flower of this kind does not arise from any embryo, and does not knit; such are the mock flowers of the melon, cucumber, &c.

False Galena. See Blind and Galena.

False Gallep, in the Mountains. See Gallop.

False Imprisonment, in Laws, is a trefpass committed against a man by imprisoning him without sufficient authority; which authority may arise either from some process from the courts of justice, or from some warrant from a legal officer, having power to commit, under his hand and seal, and expressing the cause of such commitment (2 Stat. 46.); or from some other special cause, warranted, on account of the necessity of the thing, either by common law, or act of parliament; such as the arresting of a felon by a private person without warrant, the imprisment of mariners for the public service, or the apprehending of waggoners for misdemeanor in the public highways. (Stat. 13 Geo. III. cap. 78.) False imprisonment also may arise by executing a lawful warrant or process on an unlawful day, as on a Sunday, (Stat. 29 Car. II. cap. 7. Salk. 75 Mod. 95.) or in a place privileged from arrests, as in the verge of the king's court. The means of removing the actual injury of false imprisonment are fourfold; viz. by a writ of mandamus, by writ de odio & atia, by writ de homine repugnando, and by writ of habeas corpus. The satisfactory remedy for this injury is by an action of trespasses, vi & armis, usually called "an action of false imprisonment," which is generally, and almost unavoidably, accompanied with a charge of assault and battery also; and therein the party shall recover damages for the injury he has received; and also the defendant is, as for all other injuries committed with force, or vi & armis, liable to pay a fine to the king for the violence of the public peace.

False Judgment. See False Judicature.

False Keel, in a ship, is a second keel, which is sometimes put under the first, to make the vessel deeper, and to preserve the lower side of the main keel. In our largest ships of war the false keel is generally composed of two pieces, which are called the upper and the lower false keels. See Keel.

False Mussel, is when such men pass in review, as are not actually fitted as soldiers. See Faggot, &c.

False News, spreading of, in order to make discord between the king and nobility, or concerning any great man of the realm, is punishable by common law with fine and imprisonment (2 Stat. 226. 3 Stat. 198.); which is confirmed by statutes Wel. 1. 3 Edw. I. cap. 34. 2 Ric. II. lat. 1. cap. 3. & 12 Ric. II. cap. 11.

False Oath. See Perjury.

False, or False Figure, in Arithmetic. See Position.
FALSE Prophesics. See Prophecies.
FALSE Quarters of a Horse. See False Quarters.
FALSE Relations in Mufic. In the beginning of counterpoint, before the ear was tired with conformation, every perfect concord, rendered sharp or flat, was called false relation, "and absolutely forbidden." (See Pepusch, p. 8.) Such as the flat 6th and flat 4th; but at present those intervals produce effects more agreeable to the ear, than in their most perfect state; even a flat and sharp unison and octave have been successfully hazarded by Emanuel Bach, Haydn, and Mozart.
FALSE Roof of a Hall, is that part between the upper room and the covering.
FALSE Return. On a false return by a mayor, &c. to a mandamus, or by a sheriff, &c. to a writ, a special action on the cafe will lie. See Mandamus.
FALSE Root, is that of which the value is negative.
E. gr. in the equation $x^2 + b^2 = x^2$, if $x$ be a negative quantity as $-5$, the root is said to be false; but if it be a positive quantity it is called a real or true root; if it be the root of a negative quantity, it is said to be imaginary; as $\sqrt{-5}$.
FALSE Shovel, on board a ship. See Shovel.
FALSE Name in a ship. See Stem.
FALSE Tokens, in Law, is used where persons get money or goods in their hands by forged letters, or counterfeit means. This is punishable by imprisonment by law. 33 Hen. VIII. cap. 1. By 30 Geo. II. cap. 24, a further penalty is inflicted on those who obtain money or goods by false tokens and pretences. See Cheats.
FALSE Term, in Music. Some call the interval of two semitones major by this name; but others more properly call it a diminished third.
FALSE Verdil. See Attaint.
FALSE Weights. See Weights.
FALSET, from Falsetto, Ital. a feigned voice, an octave above its natural pitch, to supply the want of sopranos or tenors; or feeble voices.
"Before the year 1600, when Caffiotti were first employed in the service of the Papal chapel, at Rome, to sing the soprano, or highest part, it was the custom to have it performed by Spaniards in falset." Santarelli. But long before that period, in early times of different, the upper part used to be sung in falset. Du-Cange derives the word falset from fausum, a term used, during the middle ages, in the same sense; and this, he supposes, from factum, whence the high tones of voice proceed. Fitch was sometimes used in a similar sense to express piping, or such high singing as imitated the sound of pipes or small flutes.
FALSIFICATION, in Philosophy, an act of the understanding, representing a thing otherwise than it is, as to its accidents; or a false enunciation, or judgment of any thing.
The circumstance, as to its accidents, is of absolute necessity in the definition, because a thing cannot be represented otherwise than it is as to essentials; for in such case the essence of the thing would not be represented; and since the essence is the thing itself, it would not be that thing which is represented, but another.
There is no fallacy in apprehension or finnition; our ideas of sense are all just and true, so far as they go; and all our delicious arise from our conceptions and conceptions from them.
FALSIF, CRIMEN, in the Civil Law, is a fraudulent information or concealment, with design to darken or hide the truth, and make things appear otherwise than they are.
The crimen falsi is committed three ways. By words, as when a witness swears falsely. By writing, as when a man frames or alters something, antedates a contract, or the like. (See Forgery.) And by deed, as when he falls by false weights and measures, debases the coin, &c.
FALSIFY, in Law, is used for proving any thing to be false. Hence we find
FALSIFYING a Record, for shewing it to be erroneous. Thus lawyers teach, that a person purchasing land of another, who is afterwards outlawed of felony, &c. may falsify the record, not only as to the times wherein the felony is supposed to have been committed, but also as to the point of the offence. But where a man is found guilty by verdict, a purchaser cannot falsify as to the offence; though he may for the time where the party is found guilty generally in the indictment, because the time is not material upon evidence. 2 Hawk. Pl. Crown, 459. We also meet with
FALSIFYING a Recovery. Thus, it is said, the issue in tail may falsify a recovery suffered by a tenant for life, &c.
And also the terms of falsifying an attainted, the coin, judgment, &c. occur. See the several articles.
FALSO-BOURDON. See FAUX-BOURDON. Plain music, of note against note, with which the plains and canticles are often chaunted. But the Italians particularly fylle falsoboondone a manner of singing in three parts, composed of a succession of 8ths, 3ds, and 6ths.

FALSO Judicia, in Law, a writ which lies for false judgment, given in the county-court, court-baron, or other court, not of record.
FALSO Retorno Brevis. a writ which lies against the sheriff, who has execution of process, for making false returns of writs.
FALSTER. In Geography, an island of Denmark, situated at the entrance of the Baltic, S. of Zealand, from which it is separated only by a narrow sea; about 60 miles in circumference, very fertile, and abounding in game. The principal towns are Nykøbing and Stubbenköping. N. lat. 54° 50'. E. long. 12° 17'.
FALSTERBO, a sea-port town of Sweden, in the province of Schonen, noted for its light-house and herring-fishery; 22 miles S. S. W. of Lund. N. lat. 55° 21'. E. long. 12° 34'.
FALVAIERRA, a town of Italy, in the Campagna; 15 miles S.E. of Frascati.
FALUGA, a small island in the Mediterranean, near the W. coast of Sardinia; 12 miles S. of Cape Argentario.—Also, a town of the Arabian Ira, on the W. bank of the Euphrates, whence an arm of that river issue to join the Tigris; 25 miles S.E. of Bagdad.
FALUN. See FALUN.
FALUS, a river of Switzerland, which runs into the lake of Neuchâtel, near Yverdon.
FALUS, a word used in many parts of France, as the name of a particular fort of mariners' lands, which is dug out of the earth, and is no other than fragments of sea shells buried at considerable depths, and amassed in prodigious
FAM

Arata in many parts of that kingdom. These they spread upon the lands in the manner of dung; and being as it were calcined and very friable, they readily dissolve, and are the finest manure of any for some soils.

FALX CEREBELL and CEREBRI, in Anatomy, are two portions of dura mater, which separate certain of the contents of the cranial from each other. See Brain.

Fals, the fickle-fish, in Ichthyology, a small fish of the tender-fish, common about the shores of the Mediterranean, but found also at the mouth of the Tiber. It is a fickle and smooth oblong fish, and has its name from resembling a fickle in figure. It is often found an ell long, and with that length is not above the breadth of one's hand. It is of a silvery colour, but its back-fins titled. Its eyes are large, and its head very ill-shaped. The common people call it the marmot-fish.

FAMAGULA, in Geography, a town of New Mexico; 50 miles S.W. of Chialoa.

FAMAGUSTA, a sea-port of the island of Cyprus, formerly called Argeia, after the name of the father of Ptolemy Philadelphia, who is said to have founded it. It derives its name Famagula from Argeia, q. d. built in the sand, as it is surrounded by a sandy land. It is situated on the eastern coast of the island, is built on a rock, and is about two miles in circumference. The walls are thick and strong, and encompassed by a deep cavity formed out of the fold rock, and flanked by twelve enormous towers. In the interior part of the city there are a pharos, three bathes, and a rampant confederation of gnomon, and a citadel. It was fortified in 1193 by Guy de Lusignan, andpossessed by the Genoese for near a century, by James the Batard, and, lastly, by the Venetians. It has two draw-bridges, one towards the land-side, and another towards the sea, which latter leads to the harbour, that is narrow, and is shut every morning by a chain fixed to one of the ends of the pier. On the caft it is defended by a chain of rocks from the impetuous waves of the sea. In this place the Lusignans were crowned kings of Jerusalem, which custom continued till the Genoese took the city; after which they installed themselves sovereigns, both of Cyprus and Jerusalem, in the cathedral of Nicea. In the 15th century this city was taken by James the Batard, after a siege of three years, flatting that the Genoese laws should be preferred. In 1590 it fell again into the hands of the Venetians, and was governed by a penipotentary. In September, 1570, the bahnhul Mulapha, general of Sultan Selim, commenced the siege of it; and in April, 1571, encamped near the town. But it was vigorously defended against the united forces of the Ottoman empire by a small band of valiant men, till at last, in Augulli, 1571, it was compelled to surrender on honourable conditions, which were barely violated by Mulapha; who caused the brave Bagadum and his attendants to be butchered without mercy. The Ottoman army consisted of 220,000 men, whilst the citizens capable of bearing arms amounted only to 4000. During the siege, which lasted ten months, the Turks fired 74,000 bombs; the remains of which are still visible in the adjacent gardens and fields, and in the ditches which surrounded the city. N. lat. 35° 10'. E. long. 53° 3'.

FAM CHAM, a town of China, of the third rank, in the province of Petcheli; 25 miles S.W. of Peking.

FAM CHAN-POU-10TU; a town of Asia, in the kingdom of Corea; 612 miles E.N.E. of Peking.

FAMARS, a town of France, in the department of the North; 5 miles S. of Valenciennes.

FAME, in the ordinary acceptation of the term, is well understood, and the love of it is a principle of very powerful and extensive influence, and needs only proper direction and government in order to be as useful as it is powerful.

Fame, in Mythology, was one of the ancient divinitie. Hefiod has described her, but without giving her genealogy. She had an established worship, especially at Athens, as we learn from Pausanias (in Attic.) and to her temple, Phidias, in his life of Callmus. But no figures or statues can exhibit this goddess in stronger characters than the picture drawn of her by Virgil:

"Now Fame, tremendous fiend! without delay Thro' Libyan cities took her rapid way. Fame, the swift plague, that every moment grows, And gains new strength and vigour as she goes. First small with fear, the severels wondrous size, And tallks on earth, and terrors above the skies. Whom, in her wrath to heaven's, the teeming earth Produ'd the fall of her gigantic birth. A monster huge, and dreadful to the eye, With rapid feet to run, or wings to fly. Beneath her plumes the various fury bears A thousand piercing eyes and lifting ears, And with a thousand mouths and babbling tongues appears. Thud'rings by night through heaven and earth the fies. No golden flanders fare her watchful eyes. On tow'rs or battlements she fits by day, And shakes the whole town with terror and dismay. Alarms the world around, and perched on high Reports a truth, or publishes a lie." etc. etc.

Pit's Handbook, iv. 255. 5. 8.

Ovid has also given a very fine picture of the fame goddes; and some other poets have likewise exerted their poetical genius upon the fame subject. From all these we may infer, that Fame, like all the giants, was the daughter of the Earth, who, to be avenged of the gods, and of Jupiter in particular, who had thunderstruck her children, brought forth this monster to blaze abroad their crimes, and make them known to all the world; for Fame spares neither gods nor men. The common representation of Fame exhibits her in a flying attitude, sounding a trumpet, to denote the surplices, attention, and intoxicate the occasion; with a flaming robe, wrought all over with eyes, ears, and tongues; the whole upper part of her wings is quite filled, as it were, with eyes; and Virgil observes that she had an eye almost under every feather.

FAMES CANIA. See BELLUNI.

FAMIL, or FAMA, in Geography, a town of Spain, anciently called Figusa, where, according to Saba, the Selencitiia had established the school and nursery of their cavalry. The soil of the neighbourhood, abounding in pasturage, had no less than 50,000 oxen, 5000 fannings, and 5000 elephants; instead of which the masters of Fama at present barely afford a few bullocks and sheep. To the veteran soldiers of Alexander, who here repose after their victories, have succeeded wretched pedlars, who live in perpetual dread of the Turks, and the inroads of the Arabs; 90 miles N. of Damascus. N. lat. 35° 10'. E. long. 36° 43'. Viozney's Travels, vol. ii.

FAMIL. See PAPA.

FAMILIA, FAM.M, commonly implies all the servants belonging to a particular master.

In another sense, family is taken for a portion of land, etc. so much as is sufficient to maintain one family.
The term hide is by our writers sometimes rendered a
mane, sometimes a family, and sometimes carcase, or
plough-land; containing as much as one plough and oxen
could cultivate in a year. See HIDE.

FAMILIA, in Natural History, a term used by authors to
express a certain order of animals, or other natural produc-
tions, agreeing in their principal characters, and containing
numerous individuals, not only different from one another,
that in whole facts, several numbers being to be collected out
of the same family, all of which have the same family char-
acter, and all some subordinate distinction peculiar to that whole
number, or though found in every individual of it, not found
in those of any others.

It has been too common to confound the words chief,
family, order, &c. in natural History. But the determinate
meaning of the word familia seems to be that larger order of
creatures, under which classes and genera are subordinate
distinguitions. Among the quadrupeds, the several genera of
the ungulate animals agree one with another in many
general characters common to all; and in which they differ
from the unguinated animals, which have all their several
peculiar characters common to all, and yet different from all
those of the others. These naturally constitute certain
larger divisions into families, and no one would ever break
through these, or bring the cat and the horse into the same
family.

In the same manner, in Ichthyology, there are several genera
of fishes, which agree perfectly in certain common characters,
and disagree from all others in them.

The arrangement of natural bodies into these families, or
general and larger classes, is of the utmost use to natural
history, when it is properly done, and the divisions are
genuine and natural; when otherwise, it is hurtful.

These divisions of animals into families are of two kinds, the
one artificial or hypothetical, the other natural.

In the systematic arrangement of organic fossils, particu-
larly of the relics of the plants of the primary race which inhabited this globe or its waters, it is found impracticable
to ascertain the genera on the principles of Linne, owing
to the entire absence of the parts of fructification; hence
the families in the arrangement of such relics by Mr.
W. H. Martin (Outlines, &c. p. 187 and 202) answer in some
degree, to the genera of recent plants, of which the fossil
remains make but one genus, viz. Phylolithus, which see.

FAMILIARIS of the Inquisition, persons who affil in
apprehecung such as are accused, and carrying them to
prison. They are assistants to the inquisitor, and called
familiaris, because they belong to his family. In some
provinces of Italy they are called crofs-bears, and in others
the families of St. Peter the Martyr; and they wore a crofs
before them on the outside garbment. They are properly
bailiffs of the inquisition; and the vob office is esteemed so
honourable, that noblemen in the kingdom of Portugal have
been ambitions of belonging to it. Nor is this surprising,
when it is considered that Innocent III. granted very large
indulgences and privileges to these familiaris; and that the
fame plenary indulgence is granted by the pope to every
single exercise of this office, as was granted by the Lateran
council to those who suffocured the Holy Land. When several
persons are to be taken up at the same time, these familiaris
are commanded to order matters that they may know nothing
of one another's being apprehended; and it is related, that
a father and his three sons, and three daughters, who lived
together in the same house, were carried prisoners to the
inquisition without knowing any thing of one another's being
there till seven years afterwards, when they that were alive
were released by an act of faith. Geddes's Tracts, vol. i.

p. 425-429. Limborch's Hist. of the Inqulf. by Chandler,
p. 187.

FAMILY of Curves. See Family of Curves.

FAMILY of Love, in Ecclesiastical History, the name of an
anabaptist sect, founded in Holland, in 1555, by Henry
Nicholas, a Weppelians. This deluded fanatic maintained
that he had a communion from heaven to teach men, that the
offence of religion confounded in the feelings of divine love;
that all other theological tenets, whether they related to
objects of faith, or modes of worship, were of no moment;
and that it was a matter of perfect indifference what opinions
Christians entertained concerning the Divine nature, provided
their hearts burned with the pure and sacred flame of piety
and love. Dr. Henry More wrote against this sect, in his "Grand
George Fox, the founder of the sect of quakers, also
exposed them, and called them a moletry tribe of fanatics,
because they took oaths, danced, sung, and made merry.
The principles of this sect were propagated in England,
and produced no small confusion. The form of abjuration
tendered to them, and the fevere proclamation issued against
them by queen Elizabeth, in 1582, may be seen in Wilkins's

FAMILY of Masters, in Geography, a cluster of small islands
near the N.E. coast of New Holland, 12 miles N.W. of
cape Sandwich.

FAMILY of Lake, a lake of North America. N. lat. 52° 35'.
W. long. 93° 2'.

FAMINE, or Famens, a small country of the Netherlands,
in the western part of the duchy of Luxembourg, on the
borders of the bishopric of Liége; the principal
towns are Marche and Roche. It is now ceded to France.

FAMINE, Port, a fortres situated on the N.E. coa of the
islands of Magellan, in South America; now neglected in
consequence of a Spanish garrision having perished for
want. In the year 1581, the Spaniards built a town at this
place, which they called Poplappville, and left it in a co-
lony, consisting of 400 persons. When our celebrated
navigator, Cavendish, arrived here in 1587, he found only one
survivor, all the others having died through famine, except
about 23 persons, who set out for the river Plata, and were
never afterwards heard of. Cavendish called the place Port
Famine. It is a very fine bay, in which there is convenient
room for many ships to moor in great safety. Here are
also good wooded and waterings, and plenty of fish and
different sorts of fowl. The place also abounds with wild
cattle. S. lat. 53° 42'. W. long. 71° 28'. Variation 2 points
westerly.

FAM-TAM-HOTUN, a town of Asia, in the king-
dom of Corea; 625 miles E.N.E. of Peking.

FAN, Flabellum, a machine used to raise wind, and
cool the air, by agitating it.

The effect of fanning ourselves when warm, in order to
cool us, though the air is itself warm which we drive with
the fan upon our faces, may be thus explained: the atmo-
sphere round, and next to our bodies, having imbibe
as much of the perpired vapour as it can well contain, receives
no more, and the evaporation is therefore checked and re-
tarded till we drive away that atmosphere, and bring drier
air in its place, that will receive the vapour, and thereby in-
crease and facilitate the evaporation, and thus contribute
to cool us.

That the use of the fan was known to the ancients is very
evident from what Terence says,

"Cape hoc flabellum, et ventulum hue facite;"

and
and from Ovid, Art. Amund. 1. 16:

"Profut et tenues ventos movile flabello."

The fans of the ancients were made of different materials; but the most elegant were composed of peacock's feathers, or perhaps painted, so as to represent a peacock's tail.

The custom that now prevails among the ladies, of wearing fans, was borrowed from the East, where the hot climate renders the use of fans and umbrellas almost indispensible.

The East they chiefly use large fans made of feathers, to keep off the sun and the flies. In Italy and Spain they have a large fort of square fans suspended in the middle of their apartments, and particularly over the tables: these, by a motion at first given them, and which they retain a long time, on account of their perpendicular suspension, help to cool the air and drive off flies.

In the Greek church, a fan is put into the hands of the deacons in the ceremony of their ordination, in allusion to a part of the deacon's office in that church, which is to keep the flies off the priests during the celebration of the sacrament.

Wiegenfert, in his translation of the embassy of Garcia de Figueroa, gives the same name to a kind of chimneys or ventiloids in use among the Peruvians, to furnish air, and wind into their houses; without which the heats would be intupportable. What is called a fan amongst us, and throughout the chief parts of Europe, is a thin skin or piece of paper, taffety, or other light stuff, cut semi-circularly, and mounted on several little sticks of wood, ivory, tortoiseshell, or the like.

If the paper be single, the sticks of the mounting are pasted on the leaf ornamental side: if double, the sticks are placed between them. Before they proceed to place the sticks, which they call mounting the fan, the paper is to be plaited in such manner, as that the plait may be alternately inward and outward.

It is in the middle of each plait, which is usually about half an inch broad, that the sticks are to be pasted; and these again are to be all joined and rivetted together at the other end: they are very thin, and scarce exceed one-third of an inch in breadth; and where they are pasted to the paper, are still narrower, continuing thus to the extremity of the paper. The two outer ones are bigger and stronger than the others. The number of sticks rarely exceeds twenty-two. The sticks are usually provided by the cabinet-makers or toy-men: the fan-painters paint the papers, print, and mount them.

The common painting is either in colours or gold-leaf, applied on a silvered ground, both prepared by the gold-beaters. Sometimes they paint on a gold ground, but it is rarely: true gold being too dear, and falle too paltry. To apply the silver leaves on the paper, they use a composition which they pretend is a great secret, but which appears to be no other than gum Arale, sugar-candy, and a little honey, melted in common water, and mixed with a little brandy. This composition is laid on with a sponge; then laying the silver leaves thereon, and pressing them gently down with a linen ball fluffed with cotton, they catch hold, and adhere together. When, instead of silver, gold ground is laid, the same method is observed.

The ground being well dried, a number of the papers are well beaten together on a block, and by this means the silver or gold get a luster, as if they had been burnished.

Fan Machine, in Agriculture, an instrument, or machine, contrived for the purpose of winnowing, or clearing different sorts of grain, seeds, &c. from the chaff and other injurious matters. There are several different machines of this kind in use. It has been remarked by Mr. Donaldson, in his Treatise on Modern Agriculture, that wind is essentially necessary in cleaning grain, or feed of any kind. The hulks, or chaff, being lighter than the seeds which they inclosed, are, by the force of wind, carried to a greater distance, and thereby a complete separation takes place. The natural action of the winds being so extremely inconstant, no doubt, he thinks, induced the ancients to construct instruments by which the operation of cleaning grain was rendered less difficult and precarious. What those instruments were, except the fan, formerly so commonly used in this country, was among the number. It was not, he conceives, till little more than thirty years ago, that any other means were thought of in Scotland for separating grain from the chaff, than the action of the natural wind operating between the two doors of the barn. There a person stood for the purpose of dropping the undressed grain from a kind of scuttle, or sieve, and in quantities proportioned to the force of the wind at the time. About the above period the fan, fan-machine, or faner, was introduced from Holland, where that kind of machine had been for a considerable time in common use, having been first brought to that country from the East Indies, where these machines had been long used in cleaning rice.

The fan, which is the acting part of the machine, is capable of being turned round on its axis with a greater or less degree of velocity, according to the force of wind necessary to answer the intended purpose. One man works the machine easily by means of a winch, or handle; another is employed in filling the hopper; and a third in riding and laying aside the grain, if not measured up at the time; when that is the case, more hands are necessary. Since threshing-mills, or machines, have been introduced, the faners are generally connected with, and wrought by them, in place of being set in motion by manual labour, by which means the unthreshed grain, after entering between the feeders of the threshing-mill, becomes invisible, till it again appears in three divisions, each entirely separate from the other; the grain being forced to one place, the chaff to another, and the straw to a third, a degree of perfection in regard to barn management, the writer fuggsels, which was unknown in any other age or country.

These machines are well constructed in many parts of Lancashire, and other more northern counties, both for being employed separately, and in combination with the threshing-machine. A representation of one is given in the Plate of Agriculture.

Fan Palm. See Chamrrops.

Fan, Sea. See Gorgonia.

Fan, in Geography. A town of China, of the third rank, in Kian-tong; 17 miles N.E. of Poo.

FANAEs, an island in the Atlantic, near the coast of Africa, about nine of ten miles in circumference, a little to the south of the Line.

FANANO, a town of Italy; 18 miles S. of Modena.

FANATIC, a wild, extravagant, visionary, enthusiastic person, who pretends to revelation and inspiration, and believes himself possessed with a divine spirit.

The word is formed of the Latin fanum, a heathen temple; for which reason the Christians called all the Gentiles fanatics; and accordingly the ancient chronicles of France call Clovis fanatic and pagan.

Among the heathens themselves there was a sort of prophetic priests, called fanatics, from whom the denomination since passed to all the rest. They had their name from the Latin fanum, temple, because they lived all together.
The FAN

FANCOURT, Sir W., in Geography, was born in the north of England about the year 1678. Of his early life we have no account, but in the beginning of the last century he was settled with a congregation of Protestant dissenters at Salisbury, a situation which he was obliged to quit on account of some change in his sentiments. He came to London, and about the year 1740, or, as others think, 1745, he set on foot the first circulating library in the metropolis, at a subscription of a guinea a-year for reading. He afterwards changed the plan, and made the subscribers proprietors; but he was unsuccessful in almost all his projects. The public are, however, indebted to him for the first idea of establishments which have been, and still are, exceedingly useful to the community; and we may hope, of great advantage to the morals and improvement of almost all classes of society. Mr. Fancourt, after experiencing a thousand changes, which poverty too frequently inflicts, was obliged to part with his library, and retire to Hoxton, where his necessities were relieved by some of his brethren till his death, which took place in 1768, when he was in the 90th year of his age. Gen. Bonfc]

FANBUR, in our Ancient Customs, the fawning-time, or fence-months in forests.

FANCY, See Phantasy and Imagination.

FANDANGO, the name of a riotous Spanish dance.

This is a very ancient national dance; and is supposed to be of which Martial speaks, when he alludes the whole force of his invective against the wanton dances of Betcia; especially of the district of Cadiz, and the voluptuous manner in which they are performed by the women. Baretti justly defines it, "a regular and harmonious convulsion of all parts of the body." The "bolero" is an imitation of it, but shortened, modified, and deprived of all those accessories which give to the fandango so very free a character. The passion of the Spaniards for these dances is extreme. Accordingly, Mr. Towsefield, in his "Travels," observes, that if a person were to come suddenly into a church, or a court of justice, playing the fandango, or the bolero, priests, judges, lawyers, criminals, audience, one and all, grave or gay, young or old, would quit their functions, forget all distinctions, and all set themselves dancing. The fandango and bolero are danced in couples, to the sound of the guitar, and the noise of castanets, which the men employ with equal precision and spiritued! to mark the time and animate their motions. In the bolero the men and women perform the same motions, but those of the women are more lively, more animated, and more expressive. The fandango is graver than the bolero; the steps are neither so lively, nor is their time so strongly marked; they move more regularly and different modes of balancing; but the inflexions of the body are more varied, and add to its gracefulness. Motions of the eyes and features mark all the particulars of this dance; the most lively expression of all the passions that agitate the heart is then exhibited. The fandango and bolero are also executed in the form of a ballet or a figure dance; they are then danced by eight, four men and four women, and at intervals each couple in its own corner goes through all the motions of these dances; these are what they call "fequillas." These dances are usually performed to the sound of the guitar, accompanied by the voice of the player. The women mark the time very correctly with the heel; these dances are not being practised in gentle society.

FANBY, a measure in Spain, containing, in the vicinity of Cadiz, 3312 field inches, and weighing a quintal, or 122 avodupois; and among the merchants 51 faneos are reckoned equal to eight Wineeller bushels of 231.4 field inches; but upon a rough calculation, two faneos of grain may be reckoned equal to three bushels; and one faneo of land, being that quantity on which they pay one faneo of wheat or two of barley, may be considered as three-quarters of an acre.

FANFAR, Tr. a kind of military air, or flourish, generally short and spirited, either performed by trumpets, or by other instruments in imitation of them. The fanfare is usually sounded by two trumpets, accompanied by kettle-drums, and, if well executed, it has a certain martial and animated effect perfectly suited to its use. Of all the troops in Europe, the Germans, in 1768, were those who had the bell military instruments, consequently their marches and fanfares had an admirable effect. It is worthy of remark, that in the whole kingdom of France there was not a single trumpet that played in tune; so that the most warlike nation in Europe had the most discordant instruments, which was not without its inconvenience. During the late war the Bohemian, Austrian, and Bavarian peasants, all born musicians, unable to imagine that regular troops had instruments to fable and to detestable, took all the old corps for new-raised troops, whom they began to despise, and it is incredible how many brave men lost their lives by false information. So true it is, that in preparation for war, nothing should be neglected that occupies the feelis. Roussia. All Europe seems now convinced of the wisdom of this remark; and all the regiments of every nation have either German bands or German musicians to instruct their young musicians.

FANFOE, in Geography, one of the Navigator's islands, in the South Pacific ocean, about five miles in circumference. S. lat. 14° 4'. W. long. 70° 23'.

FANG, a town of China, of the third rank, in Hou-nan; 30 miles S. of Yung-gang.

Fang, in Mining, signifies a truck or cafe of wood, made to convey wind or freh air down into a mine. It also signifies, in some places, a leak, or shelter, to screen the ore-diggers or miners from wind, or the dropping of water.

FANGOOMBA, in Geography, a town of Africa, in Kasaar. N. lat. 4° 15'. W. long. 70° 30'.

FANGS, or Leeches, in Rigging, a rope fastened to a cringle, near the foot of a ketch's way-fall, to haul in the foot of the fall for lacing on the bonnet, or taking in the fall.

FANIEUX, a town of France, in the department of the Aude, and chief place of a canton in the district of Carcassonne; 15 miles W. of Carcassonne. The place
contains 1807, and the canton 9015 inhabitants, on a terri
torial extent of 2321 kilometres, and in 16 communes.
N. lat. 45° 11'. E. long. 2° 57'.
FANEMBOO, a town of Africa, in Lambaram. N. lat.
14° 46'. W. long. 4°.
FANJNS, in Military Language, small flags carried
along with the baggage. See Flag.
FANKL, in Geography, a town of China, of the third
ranks, in Chan fii; 17 miles N. E. of Tai.
FANNA, a town of Italy, in Friuli; seven miles N.N.E.
of Aviano.
FANNISSIMA, a town of Japan, in the isle of Niphon;
100 miles N. W. of Jeddo.
FANO, a town of Napels, in Abruzzo Ultra; nine
miles S. S. W. of Teramo.
Fano, a few part town of the duky of Urbino, on the
Adriatic, the see of a bishop; surrounded with a lofty wall
of brick and ditches, with towers at small distances, and
bulwarks towards the sea. It has several monasteries, and
some beautiful churches. It was anciently called "Fanum Fornace," from a temple built by the Romans to the god
defs Fortune, after the defeat of Afridab, on the banks
of the Metaurus. Here are the remains of a triumphal
arch, erected in honour of Augullus, who sent hither a
colony, called "Julia Fannia." It was destroyed by
Totila, and rebuilt by Belisarius; 16 miles E. N. E.
of Urbino. N. lat. 43° 52'. E. long. 12° 56'.
FANO, or Fennia, a small island of Denmark, in the
Little Belt, situated about two miles S. from Middlefahrt,
in the island of Fanen. N. lat. 55° 35'. E. long. 9° 45'.
Allo, a small island of Denmark, near the coast of Stif
wick, in the German ocean, about 15 miles in circumference,
chiefly inhabited by fishermen. N. lat. 55° 25'.
E. long. 8° 43'.
FANPOTEN, a town on the E. coast of Madagascar.
N. lat. 15° 4'. E. long. 54° 40'.
FANSWASH, Cape, a cape on the W. coast of
North America, and N. side of Frederick's Sound. N. lat.
57° 11'. E. long. 226° 44'.
FANSWE, Sir Richard, in Biography, was born at
Ware-Park, Herts, in the year 1608. He studied at
Jesun college, Cambridge, and from thence he removed to
the Inner Temple. Having travelled into France and
Spain, he was appointed secretary to the embassy at
Madrid, under lord Aton. In the civil wars he adhered to
the royal party, and attended the court at Oxford.
He was secretary of war to prince Charles, and afterwards
treasurer of the navy under prince Rupert. He was created
baronet in 1650, and sent to Madrid to seek a loan for his
father. He next acted as secretary of state for Scotland, and
accompanied Charles II. on his expedition to England, and
was taken prisoner at the battle of Worcester. He was
soon admitted to bail, and went to the seat of lord Strafford
in Yorkshire, where he amended his leisure by translating the
"Luther." The year before the restoration he repaired to
the king at Breita, but not till he was knighted, and, after
his return, appointed master of equips and Latin secre-
tary. In 1661, he was elected one of the representatives
in parliament for the university of Cambridge, and soon
after was sworn a privy councillor for Ireland. He was
next appointed envoy-extraordinary to Portugal, and then
ambassador to that court, for the purpose of negotiating
the king's marriage with the infant Catharine. He acted in
other important diplomatic missions, but was at length re-
called by the king, who was displeased on his signing a
treaty with Spain. As he was preparing to return, he was
feizied with a fever, which carried him off at Madrid in the
year 1666. Sir Richard sustained an amiable character,
and his talents for general state affairs was universally ac-
knowledged. He is likewise known as a literary character,
chiefly by his poetical translations. That of "Guarini's
Paffor Fidea," first published in 1646, obtained for him the
reputation of an elegant and easy verifier. He likewise
translated the Luthard, and some parts of Virgil and Horace,
FANSHIRE, in Geography, a river of Madagascar,
which runs into the sea, 15 miles S. W. of Fort Dauphin.
FANTASIA, Ital. Fantasie, fr. an instrumental com-
position in Music, executed at the same time that it is con-
cived. There is this difference between a capriccio and a
fantasia, that the capriccio is a string of regular and
connected ideas, produced by a limited imagination, and
which may, however, be composed at leisure; whereas the
fantasia may be a very regular production, which differs
from written music to otherwise than by being played
immediately from the hand, and that it no longer exists after
performance. So that the capriccio depends on the assort-
ment and choice of ideas, and the fantasia on the prompti-
tude with which it presents itself. It follows that a capri-
ccio may be written down, a fantasia never; for as soon
as it is written or repeated it is no longer a fantasia, it is
a common piece of music. These were the ideas of Ronsae
40 years ago, and are now the general ideas of all who
belong a thought on the subject. But in the 17th century,
when instrumental music first began to be cultivated, the ac-
cception of the word fantasia or fancy was very different
from the present, which on the organ is termed a voluntary;
or on the harp or piano forte a toccata, toccatina, or prelude
to something else. But of what were termed fantasia,
previous to the invention of fantasias, quartets, or concertos
becoming general, the following is the history. The reign
of our James the First is a very early period in the cultivation
of music, merely instrumental. The words concerto and
fantasia seem at this time not to have been invented even in
Italy; as the Cruca dictionary gives no indication of so
care a use of them in music-books. Concerto and sonata
implied nearly the same things in the days of Boccaccio, as
concerto and fantasia since; but concertato and concerntanti
were at first applied to the union of instruments with voices,
in motets and madrigals, by doubling the voice-parts.
It was not till late in the seventeenth century that instrumen-
tal pieces, of many parts, began to be called concertos, and of
few, fantasias.
The earliest compositions we have found in Italy, for
three or more instruments of the same species, are ricercari
and fantasias. But of these, none seem to have been printed
when the elder Dani published the second edition of his
Liberina, 1557; as all the instrumental music that appears
in his catalogue of musical compositions, which had then been
published in Italy, are "Intabulatoria da organi, et da
Letto, d'Anton da Bologna, di Giulio da Modena, di Francisco
di Milano, de Jacques Buas, piu di deci volumi, e la
continua." At the beginning of the seventeenth century
madrigals, which were almost the only compositions, in parts,
for the chamber, then entered, seem to have been sud-
ently implanted in the fancy of lovers of music by a pas-
ion for fantasies of three, four, five, and six parts,
wholly composed for voices and other instruments, without
vocal alliance. And this passion seems to have caused the
calling in the use instruments to reinforce the voices,
with which they played in unison, in the performance of
motets and madrigals, hence termed concertati. At length,
the instrumental performers discovered, that both the parts
and
and flagging of the times might be spared without any great loss or injury to musical effects; as the words, if good, were rendered unintelligible by fugue, imitation, and multiplicity of parts; and the flagging, being often coarse and out of tune, could be better supplied by their own performance. Thus vocal music not only lost its independence, but was almost totally driven out of society; as the ancient Britons, calling in the Saxons to affit them in their conflicts with the Picts, were themselves subdued and forced from their possessions, by too powerful auxiliaries.

We are the better enabled to speak of the instrumental music of this period, by being fortunately in possession of several considerabie manuscript collections of fancies; particularly one in six parts, folio, which had been made for the P. Etfrange family, in Norfolk, by the celebrated composer of Charles the First's reign, Mr. John Jenkins, and collated with other copies, and corrected not only by himself, but by six or eight other eminent masters of the times.

These pieces, which consist more of motets, madrigals, and innomines, originally designed for voices, than fantasies made expressly for instruments, were the productions of William Burd, Alfonso Ferabosco, ten, and jun. William White, John Ward, Thomas Ravencroft, William Cranford, Thomas Lupo, Giovanni Coperario, and others. The style would appear now very dry and fancifis, in spite of the general title of these pieces. Indeed, it would be difficult to select one of them that would afford any other amusement to our readers, than that of discovering how ingenious and well difposed the lovers of music, during the former part of the last century, must have been, to extract pleasure from such productions.

Notwithstanding the infinite pains that have been taken in collecting and collating these books, they only prove that however inipid and deplacable we may think their contents, our forefathers were of a different opinion; and that, contemptible as they now feem, they were the bell which the first musicians of the age could then produce.

There is an infancy in every human production that is perfectible. The instruments to which these fantasies were adapted were viols of different sizes. (See Base Viol.) The passages, however, given to these several instruments at this time discover no kind of knowledge of the expressive power of the bow; and even Or. Gibbons, who compos'd so well for voices in the church, seems very little superior to his contemporaries in his productions for instruments. Indeed, his madrigals of five parts, as well as those of many others, are paid in the title-page to be apt for viols and voices: a proof that with us, as well as the ancient Greeks, and other nations, there was at first no music expressly compos'd for instruments; consequently, the powers of these instruments must have been circumscribed; and when this music was merely played, without the assistance of the human voice and of poetry, capable of no great effects. The subjects of Orlando Gibbons's madrigals are so simple and unmarked, that if they were now to be executed by instruments alone, they would afford very little pleasure to the greatest friends of his productions, and those of the same period. At the time they were published, however, there was nothing better with which to compare them, and the bell music which good ears can obtain, is always delightful, till better is produced. Air, accent, grace, and expression, were now equally unknown to the composer, performer, and hearer; and whatever notes of one instrument were in harmony with another, were welcome to the player, provided he found himself honoured from time to time with a share of the subject, or principal melody; which happening more frequently in canons, and fugues, than in any other species of composition, contributed to keep them so long in favour with performers of limited powers, however tiresome they may have been to the hearers when constructed on dull and barren themes.

Music is so much a work of art, study, exercise, and experience, that every style must be held treated, even by men of the greatest genius, in proportion to the attention and labour they bestow on that particular species of composition. Orlando Gibbons, who appears to such advantage as a church composer, is utterly contemptible in his productions for instruments, of whose powers he was ignorant. Indeed, all instrumental music, but that of the organ, seems to have been in a very rude state at this time throughout Europe; and, if we except the fugues of Frescobaldi, all the music, even for keyed-instruments, is dry, difficult, unaccompanied, and infipid.

FANTASTICAL COLOURS, are the same with those called emphatical colours.

FANTIN, in Geography, a country of Africa, on the Gold Coast, extending about thirty miles along the coast of the Atlantic. It is bounded by Sabu on the west, the Iron mount, half a mile below Mawri, being its extremity. From the foot of this hill Fantin extends about five miles eastward along the coast, having on the north side Arrt Agua, and Tongua; Akron on the east; and the sea on the south. The soil is fertile, producing fruits, maize, and palm wine. The European natives have long traded here for gold and slaves. But the natives trade freely with interlopers, frequently shutting up all the passages to the inland countries, and prevent all trade between the Europeans and the merchants of the interior kingdoms in gold and slaves; and they have sometimes starved the Dutch in their forts, till their demands have been complied with. The inhabitants are bold, cunning, and deceitful. Their government is arbitraries; the bravo, as their chief magistrate is called, leads their armies into the field, and polfresses the chief power, though it is greatly restrained by the old men, who form a national council, the votes and acts of which are entirely independent of the bravo. Every town and sub-division of the country has also its chief, who frequently assumes independence, and enters on a war with his sovereign and the council of elders. Their intestine divisions are the chief security of their neighbours, as they are able to assemble an army of 100,000 men. They reckon about 4000 fishermen on the coast, and their small towns are very numerous. The capital, of the same name with that of the province, is about twelve miles up the country; and their other principal towns and villages are Anamobas, where the English have a fort, Adjia, or Aga, where the Dutch formerly had a fort, Little and Great Cormantin, Agua, Laguay, Tantimeque, and Manpran. N. lat. 5° 10'.

FANTOME CORN, in Agriculture, a term applied to such thin or light corn as has but little bulk or lankiness. In this fort of grain there is but a small portion of the farinaceous matter.

FANTONI, John, in Biography, a celebrated physician, was born at Turin in the year 1675. He studied philosophy and the belles lettres in the university of his native city, and evinced a superiority of talent in the rapid progress which he made. He then passed to the medical chairs, in which he gave further evidence of his abilities, and obtained his degree of doctor. He was enabled, through the liberality of his prince, to visit foreign seats of learning in pursuit of improvement in his art, and traverse France, Germany, and the Low Countries, every where making valuable additions to his knowledge. On his return to Turin,
Turin, he commenced public teacher of anatomy, and after
wards was successively chosen to fill the chairs of theo-
retical and practical medicine. In the interim the king of
Sardina appointed him physician to the prince of
Piedmont, his son. This office, however, did not inter-
fere with his labours in the university, where he was
still distinguished near the middle of the succeeding cen-
tury, notwithstanding his advanced age.

The first published work of Fantoni was entitled "Differ-
tationes Anatomicae XI. Taurini, 1701." The second
"Anatomia corporis humani ad umum Theatri Medici ac-
comodata, ibid. 1711." This edition, which is, in fact,
a part of the preceding work, relates to the anatomy of
the abdomen and chest only. 3. "Dissertationes de
structura et usu ducis matris et lymphaticorum vasa-
ad Antonium Pacchionum conscriptas, Rome, 1721."
4. "Dissertationes de Thernis Valderianis, Aquis
Gratianis, Maurianenibus, Geneva," 1725, in 8vo. and
1738 in 4to. 5. "Opuscula Medica et Physiologica, Ge-
neve, 1738." This contains likewise some observations of
his father. 6. "Dissertations Anatomische sepient pionnes
renovata, de Abdomine, Taurini, 1745." 7. "Commentari-
olum de Aquis Vindolenibus, Augufianis, et Anno-
fenibus, ibid. 1747."

Fantoni, John-Baptist, the father of the preceding,
though less distinguished than his son, was also a teacher of
anatomy and of the theory of medicine at Turin, as well as
librarian, and first physician to Victor Amadeus II. duke
of Savoy. He died prematurely in 1562, having only
attained the age of forty,) in the vicinity of Embrun, where
the duke, his patron, was encamped, during the siege of
Chorges. He left several unfinished manuscripts, which
John Fantoni revised, and of which he published a collection
of the best parts, under the title of "Observationes Anato-
micae medicæ efecliores," at Turin, in 1699, and at Venice
in 1713. This work contains some useful observations re-

Fanum, in Geography, a small island in the Mediterra-
nean, 10 miles N.W. of Corfu.

Fanum, among the Romans, a temple or place conefec-
tated to some deity. The defiled men and women among
the heathens had likewise their &a; even the great philos-
opher Cicero erected one to his daughter Tullia. Mem.
Acad. Inscrip. vol. i. p. 488, feq.

Fanum Vires, in Ancient Geography, was built, ac-
cording to Ptolemy, on the banks of the Rhine. Some
authors have supposed that the castle of Batavleun, now
Vinnen, was erected upon the foundation of this ancient
temple.

Fanum Fortunae, a town of Italy, in Umbria. See Faxo.

Fanum Jovis, a temple of Jupiter, situated in Asia Mi-
nor, near the Thracian Bosphorus and the Strymon pro-
montory.

Fanum Martis, the denomination of several places in
Gaul. Hence sprung, according to the Notitia Imperii,
the name of "Pagus Fanomartensis," given to a great part
of Haut. This is probably the place now called Farnas;
which fee.—Also, another place of Gaul, mentioned in the
Itinerary of Antonine, on the route from Alana to Conda-
te Redonum, between Cofedia and Fines, at the limits of
the Abreenitai. It is placed by M. D'Anville a little to
the south of Conflantia, on the sea-coaL, at a place now
called "Mont Martin."—Also, another place of Gaul,
presented to the Pentingtine table, between Cundate
Redonum to the south-east, and Regionis to the north-well,
upon the sea-coast, the principal place of the Criulous.

Also, a place of Italy, in Etruria. Cluvius.

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Fanum Minervae, a town of Gaul, marked in the Itine-
ry of Antonine, and placed by M. D'Anville to the
south-east of Durocoritum or Rheims.

Fanum Peregrinum. Sec Perusia Peregrinum.

Fanum Polumnus, a small place of Italy, in Etruria.

N.W. of Telleri.

FAN-YUAN, in Geography, a town of Corea; 25
miles E.S. of Kang-chedu.

Fanzara, a town of Africa, in Fez; 15 miles S. of
Salee.

Fagon, L., a town of France, in the department of
Finitterre, and chief place of a canton, in the district of
Chateaulin; 13 miles N. of Quimper. The place contains
632 and the canton 5,400 inhabitants, on a territory of
95 kilometres in 5 communes.

Fague, or Fouah, a town of Egypt, situated on
the well branch of the Nile, was formerly a sea-port, though
it is now 20 miles from the sea. When the Nile was
allowed to fill the canals with its waters, which once sup-
ported trade and diffused abundance; when boats laden with
the commodities of Europe and Asia could navigate in
tranciuit the coast of Alexandria, without being subject to
the fury of the sea and of the "Boghafis," Fouah, which
was situated at the entrance of this canal, was a large and
flourishing city, where the Europeans had their commercial
cablishments. The Venetians kept a caulfl here, and
merchandise was brought thither by the canal of Alexandria.
But the fupreinities of the tyrants of Egypt having hurried
the mud to collect in the bed of the canal, so as to obftruct
navigation, commerce was compelled to abandon the shore
of Fouah, and carry its means and its riches to the harbour
of Rosetta, where a variety of dangers render its progress
uncertain. Fouah has, therefore, very considerably de-
clined from its former splendour. Belon, who travelled in
Egypt in 1530, says, that Rosetta was much smaller than
Fouah; but the reverse has since taken place. Its con-
tracted limits, the ruined flate of its ancient edifices, and
those yet standing, undermined by want and wretchedness,
announce the rapid approach of a general decay. The
fields, however, that surround Fouah display a rich and
failing fertility; while its delightful gardens produce fruits,
which, on account of their superior excellence, are held
in highest estimation. Many have supposed that this city is the ancient Metedi, but Somnini has placed this town near Ro-
setta, conceiving that Fouah was Nacaratis, built by the
Milenias, as it is imagined, in the reign of Piammetetius,
and the country of Athenus, a celebrated grammarian, who
remains that, in his time, there were fabricated in this
town eathen vales, the covers of which had the appearance
of silver. In front of Fouah the Nile forms, in the middle
of its course, an island called "Geziret-el-Dahab," or
golden island. Fouah is distant 16 miles S.E. from Rosetta,
and 70 N.N.W. from Cairo. N. lat. 31' 10'. E. long. 31'.

Fauquet, a town of France, in the department of
Morbihan, and chief place of a canton, in the district of
Pontrieu, 18 miles N. of L'Orient. The place contains 2,551
and the canton 12,069 inhabitants, in a territory of 2576
kilometres and 7 communes. N. lat. 48' 47'. W. long. 5' 24'.

Fapesmo, in Geo optic, one of the moods of fyllogism.
A syllogism in fapesmo has its fifth proposition an univer-
se affirmativa, the second an univeral negative, and the third
a particular negative.

Fauquier, in Geography, a county of America, in
Virginia, bounded N. by London, and E. by Prince Wil-
lain; about 55 miles long and 25 broad, containing 12,975
free inhabitants, and 8,511 slaves. It has a poft-houfe; 51
miles from Washington.

R. Fauquier.
FAR

FAR, in Horsemanship, an appellation given to any horse's right side: thus the far foot, the far shoulder, &c. is the same with the right foot, right shoulder, &c.

FARA, or FARAH, in Geography, one of the Orkney islands, two miles long and one broad, and two miles W. of Eday. In ordinary years, its soil and surface are more than sufficient to raise grain for the supply of its inhabitants.

N. lat. 59° 2', W. long. 2° 43'.

FARA, or FARAH, one of the smaller Orkney islands, noted chiefly for its excellent sheep-fattures; near Riffay and the east coast of W. A. V., which at low ebb forms one island with Hoy.

N. lat. 58° 43', W. long. 3° 1'.

FARA. See Far iff.

FARA, a town of Arabia Felix; 230 miles W. of Ca-them.

FARAB, See OTRAR.

FARABAT, a Persian port on the Caspian sea. This port, and Madghetafar, are situated on the southern coast, in the province of Mazenderan; they are both small villages, of which Madghetafar is most commercial from its vicinity to Balrucht, capital of the province, where the Russians and Armenians carry their merchandise. See BALRUCH.

FARADEESE, a town of Africa, near the east coast of Tunis, the inhabitants of which more than a century ago were the greatest cutlers and most experienced mariners of the country, though nearly four miles from the sea, their port being a small creek in the gulf of Hamam-et; but the superior conveniences for navigation at Hamam-et, and the increase of trade, have, of late years, drawn thither all the inhabitants; 22 miles W. of Hamam-et, and 30 S. of Tunis. Shaw's Travels, p. 91.

FARAGONOUS MOUNTAINS, in Geography, according to Mr. Kirwan (by others called tertary), are such as have resulted from the ruins of other mountains or strata, of different species jumbled together, according to the theories of these authors.

FARAH, in Geography, a town of Arabia, on the S. coast of the Persian gulf; 200 miles E.S.E. of El Calif. N. lat. 25° 7'. E. long. 51° 30'.

FARAM, one of the smaller Shetland islands. N. lat. 66° 4', W. long. 1° 26'.

FARAMA, a ruined town of Egypt, originally founded by the Arabs, and situated a little to the leftward of Polu-fnum. This town did not long subsist, for it was destroyed in the 15th century. It had a mausoleum, which some have erroneously supposed to be the tomb of Galen, but which in reality was that of Pompey, placed by Phay at Phrom where it is admitted to form Cefus, in the vicinity of which are the ruins of Parna.

FARAMEA, in Botany, Aubl. Guian. v. I. 105: t. 47. Julii. 209. A genus, consisting of two species in Aublet, whose fruit is not sufficiently determined. It appears nearly related to the Cephalis of Swartz and Wildenow, Callicoccus of Scheber, but wants the involucrum. The flowers are trinervious and four-elliptical. Nat. Ord. Rubiaceae, Julii. See CALICOCOA.

FARAN, in Geography, a valley of Arabia, which extends from the Red sea to mount Sinai.

FARANAGUR, a town of Hadraman, in Dowlatabad; 36 miles S. of Amedagur.

FARAND MAN, in our Old Writers, a traveller or merchant-stranger, to whom by the law of Scotland justice ought to be done with all expedition, that his business or journey be not hindered.

FARAN, in Geography, a town of Africa, in the kingdom of Ludamar; 30 miles N.W. of Benown.

FARANSK, a town of Russa, and one of the 13 districts in the government of Viatka, situated on a rivulet falling into the Via-tka.

FARANONI, a town of European Turkey, in Moldavia; 16 miles S. of Bakeu.

FARAT, a river of Nubia, which runs into the Red sea, N. lat. 21° 45', with good depth of water at its mouth. FARAR, was originally a droll, petty show, or entertainment, exhibited by charlatans, or quacks, and their buffoons, in the open street, to gather the crowd together.

The word is French, and signifies literally force-meal or stuffing. It was applied on this occasion, without doubt, on account of the variety of drolls, jokes, tricks, &c. whereby the entertainment was illustrated. Some authors derive farce from the Latin farsa; others from the Celtic farce, mockery; others from the Latin farceari, to stuff.

At present, farce possesses a little more dignity. It is removed from the street to the theatre; and instead of being performed by merry-andrews to amuse the rabble, is now acted by our comedians, and become the entertainment of the polite audiences.

The poets have reformed the wildness of the primitive farces, and brought them to the taste and manner of comedy. The difference between the two on our stage is, that the latter keeps to nature and probability; and, in order to that, is confined to certain laws, unities, &c. prescribed by the ancient critics.

The former disallows of all laws, or rather sets them all aside on occasion. Its end is purely to please, or to make merry; and it sticks at nothing which may contribute to this end, however wild and extravagant. Hence the dialogue is usually low, the personages of inferior rank, and the action is often trivial or ridiculous; and nature and truth make no appearance anywhere, is heightened and exaggerated, to afford the more palpable ridicule.

FARCILITE, in Mineralogy, is a substance composed of masses of bone, cemented together by a flinty cement. See Kirwan's Geol. Eff. p. 153, 225, and 338.

FARCIMINALIS TUNICA, the same with allantois.

FARIN, FARIC, or Fussion, a disease in horses, and sometimes in oxen, &c. somewhat of the nature of a febric, or mangle.

Gefeller derives the word from varioces, by changing the v into a digamma or $.

The pain is infectious, and spreads like a true plague. Vegetius calls it morbus farciniformis. It consists in a corruption of the blood, which thaws still in eruptions of hard pustules, knots, or nodules (as they are commonly called) along the veins. Hence they are erroneously supposed to be whelks, which is not the case. The uncommon cause of farcy seems to be contagion, either from a glandered or farcied horse; for, according to Mr. White (Treat on Veterinary Medicine, vol. i.), there can be no doubt that these dicas will reciprocally produce each other. We may conclude, that they both originate from the same poison, producing different effects, according to the parts on which its noxious influence is exerted. Its effects, however, are partial; the internal parts of the body more particularly liable to be affected by it: the skin is likewise very susceptible of its action; and when the disorder has continued long, so that the poison has produced its full effect,
the lungs do not escape the contagion. The farcy, says Mr. White, may be either constitutional or local. If glandular matter, or the matter taken from a farcy-ulcer, be applied to the skin, when the cuticle has been shaved, a chancre or foul ulcer is produced, which is distinguishable from all others by its peculiar foul appearance, the edges becoming thick, and the discharge consisting of a thin and rather glutinous matter. It generally spreads rapidly, and never looks red or healthy. The abscesses or lymphatics about the ulcer become inflamed and swollen from an absorption of its poisonous matter. These swellings are commonly mistaken for veins, and hence it has been inferred that the blood-vessels are the seat of the disease; the glands likewise, to which these lymphatics lead, become inflamed and enlarged; at length small tumours or buds appear in the course of these abscesses, which are small abscesses arising from the inflammation of these vessels. Thus far, says Mr. White, the disease is local, and the constitution untouched; at length, however, the poison, which has been arrested by the glands, infests its first connate circuit, and infects the whole mass. The internal parts of the nose are generally first attacked; the next part that is affected is usually the skin, on various parts of which "farcy-buds" appear, and degenerate into foul spreading ulcers; at length the boughs of the nose become carious or rotten; and, finally, the poison falls upon the lungs, and soon terminates the animal's sufferings. Sometimes the progress of the disease is very rapid, and in a short time destroys the horse; at other times it is remarkably slow, and continues for a long time, without lethally affecting either the appetite or strength.

In the first stage of the farcy, while it is local, a cure may be easily accomplished, and topical applications will be sufficient to remove it. If the actual canthar be freely applied at this time, so as to destroy all the poisoned parts, the disease will be completely eradicated, and the chance converted into a common sore, which will assume a red healthy appearance, and the cure may soon be completed by the application of a haftentiment. But if the disease has been neglected, or not perceived at its first connate circuit, the lymphatics are enlarged or cored (as it is termed by the farrières); and if the neighbouring glands should be swollen, the cure is much less certain. Some of the poison may, in this case, have got into the circulation, though its effects have not been visible. In this stage, however, the chance may be completely cured by the actual canthar, or other strong caituffs; and if the poison shall not have passed the glands, the cure will be radical; but if, on the contrary, the smallest portion of the poison should have infiltrated itself into the blood, the whole mass will be poisoned, and the symptoms will be such as have been already described. When the first appearance of the farcy has been neglected, it will be advisable to give a ball, formed of mixture of quicksilver &c., powdered aniseds &c., and any ferup, once, twice, or three times a day, if the horse's strength will admit of it, restraining its effect upon the bowels or kidneys by means of opium; at the same time it will be necessary to keep up the horse's strength by a liberal allowance of corn. Malt has been found useful on these occasions. During this course of medicine the horse must be warily clothed, have regular exercise, and never be suffered to drink cold water. Some have recommended vendeca in this disease; but Mr. White had no opportunity of observing its effect. The balls above-mentioned have proved so efficacious, that he has had seldom any occasion for trying other remedies; but they should be continued for two or three weeks after every symptom has disappeared, or else the cure will seldom be permanent.

It is not improbable that the farcy, as well as the glanders, may sometimes occur spontaneously; or at least, in many cases, it may not be traced to any assignable cause; and yet it might have arisen from contact with poisonous matter, though the mode of communicating it has not been ascertained. With respect to that kind of farcy which appears in the form of diffused swellings of the limbs or other parts, Mr. White is of opinion that it seldom originates from infection, and does not often depend on the action of the glandular matter, being merely common septic swellings, such as accompany the gout. Hence we may account for the efficacy that has been sometimes attributed to purgatives and diuretics, as remedies for the farcy. When large abscesses are formed in consequence of farcy, they do not require any particular treatment, but the horse's strength should be supported in such cases by means of corn and milk. Some have supposed that the farcy depends altogether upon deformity; and hence medicines of the tonic or strengthening kind have been advised for its removal. When the ulcer becomes infected, it is recommended the following mixture, viz.: half a pint of linseed oil; oil of turpentine and nitre, of each three ounces; tincture of euphorbium and hellebore, of each two drams; the father's ointment, or oil of bays, two ounces; oil of originum, half an ounce; double aqua fortis, half an ounce; when the ballition is over, add two ounces of Barbados tar. With this mixture rub the tumours and corded veins once in two or three days, opening a passage to the matter issuing from the ulcers, if they are choked up, with a small hot iron, and destroying with vitriol the proud flesh, which may be kept down by touching with oil of vitriol, aqua fortis, or butter of antimony. Dr. Bracken recommends the mercurial ointment for rubbing the cords and tumours before they break, in order to diffuse them; and when they are broke, to dress the fores with equal parts of Venice turpentine and quicksilver. Mercury has been likewise given internally in various ways; two ounces of each, and gum guaiacum, of each two ounces, and sufficient quantity of horse-dust, have been successfully given in the quantity of one ball twice a week; but when mercurials are administered either internally or externally, gentle purgatives should be interpolated to prevent a falivation.

The water-farcin, which is a kind of drupay, proceeds from a horse's feeding on low watry grounds, and in pits or holes where the grass grows above the water; for the horse in picking out the grass fills up the water, which occasions him to swell under the belly or chaps.

The water-farcin is of two kinds; one produced by a feverish disposition, terminating on the skin; and the other a true drupay, in which the water is not confined to the belly and limbs, but it is found in different parts of the body, where a great number of soft swellings appear, which yield to the pressure of the finger. The first species may be relieved by physic fornications in the intestine of the leg and thigh with a sharp pointed instrument; but in the other species the water must be delivered, and the crust of the boil recovered by a purge given every week on the days, and immediately after the fluid the following ballient; viz.: two ounces of nitre, two ounces, aqua fortis, one dram, or half an ounce; camphor, one dram, and a sufficient quantity of honey, to bring them of a due consistence for balls. This ball should be given once a day, and washed down with a
borne or two of the following drink: take of black hellebore, fresh gathered, two pounds; washed, bruised, and boil it in six quarts of water, till it is reduced to four; strain off the liquor, and pour on the remaining hellebore two quarts of white-wine; place it in a gentle heat, and let it infuse forty-eight hours; strain it off, and mix both together, and give the horse a pint of it night and morning. When the horse begins to recover, complete the cure by giving him half a pint of the following infusion every night and morning for a fortnight, and let him fast two hours after it: take gentian-root and zedoary, of each four ounces; chamomile-flowers, and the tops of centuary, of each two handfuls; of Jefuit’s bark, powdered, two ounces; of juniper-berries, four ounces; of filings of iron, half a pound; infuse the whole in two gallons of ale for a week, making the veife often.

We have in the Philosophical Transactions an account of a horfe being cured of this difeafe by hemlock. The discovery was accidental; the master of the horse, riding near a place where hemlock grew abundantly, suffered his horfe to eat greedily of it, and he became better from that time, and in a few days was wholly cured. We generally excife hemlock a poifon; but besides this proof of its fataliy effeét, it is well known that its seeds are eaten by some birds, particularly by the buliards, in very great quantities, withont any harm.

FARDAN, in Geography, a town of Peru, in the province of Segellan; 155 miles S.W. of Zarene.

FADEL, of Land, in Rural Economy, is a term which, according to some, signifies a fourth, but which Noy afferts to be only the eighth part of a yard-land. See Yard-Land.

FARDING-Bag, a term sometimes used to signify the first plum of a cow or any other ruminant animal. It is chiefly employed by farmers.

Fardin-Deal, or Farding-Land, in our Ancient Customs, signifies the fourth part of an acre, now called a rood. In the register of rents we have also denariata, obolata, solidata, and librata terra, which must probably rife in proportion of quantity from the farding-deal, as an half-penny, penny, shilling, and pound, rife in value; on which footing obolata must be half an acre; denariata, an acre; solidata, twelve acres; and librata, twelve-score acres.

Yet we find vigilant librata terre, vel reditius; Reg. fol. 94. a. and 284. b. where librata terra should seem to be as much as yields xx s. per annum; and centum solidatas terrarum, tenementorum, et reditium, fol. 249. a. Others hold oblata to be but half a perch, and denariata a perch.

FARDINGDEL, was the fourth part of a yard-land, or of a plough-land, according to Spenman. See FardeL.

FAREL, a voyage or paffage, or the money paid for paffing by water, &c.

For the fares of hackney coachmen, watermen, &c. see Hackney-Coaches.

FARE of Pigs, in Rural Economy, a provincial mode of exprefling the number of pigs which a few brings forth at one time. See Farrow.

FAREHAM, in Geography, a market town in the hundred of that name, and division of Portfdown, in Hampshire, England, is fiuated at the north-western extremity of Portsmouth harbour; and owes its chief importance to its vicinity to that naval eftablifhment, its principal trade and manufactures being those of faking and ropes for Shipping, of which it supplies great quantities to the dock. The town is well built; has a parish-church and two meeting-houses. The civil government is veiled in a bailiff, two constables, and two ale-conners, who regulate all matters relative to weights, measures, trade, &c. Vefiels of large burthen are built at the quay. During the summer fefon this town is much frequented for the purpose of sea-bathing; and a commodious bathing-house has been lately erected. Fareham is 72 miles fiftant from London: has a good market on Wednesdays, and an annual fair well fupplied with corn, cheese, hops, &c. The population report made to parliament in the year 1801 was 555 houses and 3032 inhabitants.

FAREL, William, in Biography, the fon of a gentle- man in Dauphine, in France, was born in the year 1489. He dilinguished himself at the university of Paris for rapid proficiency in the ancient languages, and though brought up with the Papils we find him preaching the principles of the reformed religion at Meaux, in the year 1521. Two years afterwards a perfecution was commenced by the Francifcans against thofe whom they chose to finge out as heretics; among thefe was Farel, who, to provide for his own safety, fled from France. He retired to Strauburg, where he was acknowledged as a brother by Ducer and Capito, as he was by Haller, Colomphiadius, and other eminent reformers in Switzerland. At Bern he publicly defended his opinions, in fet thefes, againft the doctrines and practices of the Catho- lieks, till he excited so much oppofition as obliged him to quit the place. He now undertook the reformation of Montelard, and was very fucceful in the attempt, but his zeal was too nearly allied to intertemperance to produce all the effect that his talents were capable of commanding. On a proceeding day, he tore from the hands of the priest the image of St. Anthony, and threw it into the river; which, with flend-high coft him his life, and which, among other acts of violence, led Erasmus to think and to fpeak flightingly of him. His friend Colomphiadius was the means of moderating his temper, by ferviously expofulating with him on the fubjeét in an epiftary correpondence. „Men,” faid he, in one of his letters, „may be led, but will not be driven by force. Give me leave to fay you do not feem in every re- spect to remember your duty, you were fent to preach, not to rail. Pour on wine and oil in due feafon, and demean yourfelf as an evangelift, and not as a tyrannical legiflator.” Farel travelled from place to place in the character of a re- former; and from many of the scenes of his exerfions and labours he was driven by the bigotry and fanatifm of the times. At Neuchtel and Geneva he exercised the office of pafiors; and at Metz he planted a church, and obtained numerous profeflytes, but he and his followers were obliged to fly from that city, and take refuge in the alley of Gorze, where the count of Furtenberg took them under his protec- tion. Their enemies were, however, more powerful than their friends; they besieged them in their aflylum, and obliged them to surrender upon a capitulation. Farel ef- caped and returned to Neuchtel, where he refumed his labours with much af fiduity. In 1553 he was obliged to appear at Geneva, to anfwer a charge brought againft him that would, if true, have affected his life, but, according to Calvin, it was an infamous fabrication, in return for his zeal in reproving public vice. At this time Farel, with utter inconfistency of character, and to his own eternal dif- grace, affiled in the perfecution and murder of Strozzi. In 1558 he married; and in 1565, as he was on a journey, he was taken ill and died, being about 65 years of age. He was diftinguifhed for an unadulterated spirit; for a command- ing voice, and for a powerful eloquence. His writings are neither numerous nor important. They confift of thifes: difputation, and fome practical treatifes. Bayle.

FARELAINS, in Geography, a town of Portugal,
the province of Entre Duero y Minho; six miles N.E. of Villa de Condé.

FARELLA, a small island in the East Indian sea. S. lat. 6° 48'. E. long. 104° 27'.

FARELLO, a small island in the Spanish Main, near the coast of Darien. N. lat. 9° 43'. W. long. 74° 40'.

FARE, in Ichthyology, a name given by the Swedes to a fish peculiar to their country. It is of the genus of the euryperis, and is distinguished by Artedi by the name of the yellow-eared euryperis, with thirty-seven bones in the pinnas ani. See CYPRIUS.

FARESKUR, in Geography, a town of Egypt, on the east branch of the Nile; seven miles S. of Damietta.

FAREWELL, Cape, a cape on the S.W. coast of East Greenland. N. lat. 59° 38'. W. long. 44° 45'.—Also, a cape on the N.W. coast of Tavini-Passamoomo, the southern island of New Zealand. S. lat. 40° 33'. W. long. 186'.

FARFANA, a town of Spain, in Catalonia; five miles W. of Balaguer.

FARFA, a name given by some of the ancient Botanists to the plant we call colchic foot, from the river Farfars, a river of Italy, mentioned by Ovid as remarkable for its shady banks, which afforded a very large quantity of the plant. Phyth mentions this plant with much confusion, calling it also farfane and farfagno, and forgetting that he had before described it under the name of tuffilago or helichron. See Tussilage.

FARRUGUM, a name by which some authors have called the caltha palustris, or maist-marjorygd.

FARGEAU, St. in Geography, a town of France, in the department of the Yonne, and chief place of a canton in the district of Joigny; 25 miles S.W. of Joigny. The place contains 2095, and the canton 662 inhabitants, on a territory of 2571 kilometres, and in seven communes. N. lat. 47° 38'. E. long. 3° 10'.

FARIAH, a town and province of the country of Balk, on the borders of Períia; 90 miles W. of Balk. N. lat. 36° 18'. E. long. 63° 40'.

FARJAN, a town of Persia, in the province of Irak; 75 miles S.W. of Hamadan.

FARIBE, a town of Africa, in the country of the Foulahs, on the Senegal. N. lat. 16° 45'. W. long. 14° 34'.

FARIDABAD, a town of Hindostan, in the soubah of Delhi; 18 miles S. of Delhi.

FARIGLIANI, a small island near the east coast of Sicily. N. lat. 37° 35'. E. long. 15° 15'.

FARILA, a town of Sweden, in Helingland; 39 miles N. of Hudwickfow.

FARILHOENS, two small islands in the Atlantic, near the coast of Benguela. S. lat. 12° 25'.

FARIM, a town of Africa, and capital of a province or kingdom of the same name, belonging to the Papius, on the river St. Domingo. N. lat. 18° 10'. W. long. 14° 50'.

FARIMA, or BANSU, a province of Japan, on the S. coast of the island of Nippon, abounding in manufactures of silk, cloth, paper, &c.

FARINA, in Agriculture, a term frequently used to signify the fine mealy substance afforded by pounding or grinding different sorts of grain. It is very prevalent in wheat, conflatting in a great measure, the flour from which bread is made. It is found to partake somehow of the nature of gum, but has considerably more taste, is more fermentable, and greatly more nutritious. It is likewise abundant in many vegetables, being mouldly de-

poised in certain parts of them, apparently for the purpose of being more beneficially accommodated to their nourishment and support. Many of the bulbus and other roots, as well as those of the potatoe, branx, &c. and such as afford different preparations, as lapo, caffava, &c. contain a large portion of white feecules, which greatly resembles, and in reality affords the properties of farina. The innumerable clafes of plants, as peas, beans, &c. are also found to abound in this sort of matter. The largest quantity of this material is, however, met with in grains, as wheat, barley, rye, and oats, which are in consequence of it denominated farinaceous grains. It likewise abounds in rice, and other plants of the same kind.

When only slightly examined it seems to be a substance of a homogeneous nature; but from actual experiment it is found to be a compound, constituted of three different parts, which are easily separable. Where it is taken from wheat, this is easily flown by simply forming a paste with a quantity of it and cold water, and then suspending it in a bag of mucin, or other similar cloth; afterwards letting fall on it a stream of cold water from a height, the containing bag being occasionally squeezed in a gentle manner: the water in its descent conveys away with it a very fine white powder, which may be received with the water in a vessel placed below, underneath the bag. This process is continued until nearly the whole of the water is employed, which is flown by the water that passes through the bag, the latter having a milky colour. The operation being completed, the farina is found to be separated into three distinct substances: the glutinous, or vegeto-animal part remains in the bag; the amyilage, or farlch, is deposited at the bottom of the water, which has been received in the vessel placed below the bag; and the mucous matter is held dissolved in the water from which the farlch has been deposited, and is capable of being brought to the confidence of treacle, by evaporating the water in which it is held in the state of solution.

It is likewise found, that these several different parts vary greatly in their sensible and chemical properties. The vegeto-animal part has a whitish grey colour, being a tac-nicious, dutile, elastic matter, partly perplexing the texture of animal substances. When diffilshed in a retort it yields, like all animal matters, a true volatile alkali; and its coal affords no fixed alkali. It is not only insoluble, but even indifferent in water; both which are flown from its remaining in the bag, after long continued lotions or washings. Like other animal matter, it is flocculated by acid, and inflamable in water, and yields on dilution a process very different from those afforded by gums. It is conse-

quently of an animal nature, and would seem to approach nearer to the congelable lymph of animals than to any other substance. The fixed alkali, by means of heat, dissolves the vegeto-animal gluten; but when it is precipitated from this solution by means of acids, it is found to have lost its elasticity. The mineral acds, and especially the nitrous, are likewise capable of dissolving the vegeto-animal part of farina. The amylaceous, or farlchy matter, forms the principal part of the farina. As already noticed, it is that fine powder which is deposited from the water which has pervaded the entire farina; it is of a greyish white colour, but is capable of being rendered much whiter by making it undergo a certain degree of fermentation. Starch is incapable of solution in cold water, but in hot water it forms a transparent glue; hence the necessity of employing cold water in separating it from the vegeto-animal part. When diffilshed in a retort, it affords an acid phlegm; and its coal yields, like other vegetables, a fixed alkaline salt. As farlch constitutes the greatest part of the farina, it is probably the chief
chief nutritive constituent principle in bread. The mucous, or rather mucino-saccarine matter, is only in a very small proportion in bread. Upon undergoing distillation it is found to present the same phenomena as sugar. The use of this matter is to make the bread white and crisp; it is also a fermentation; and it is not improbable but that the making of good bread may depend on a proper proportion of the three different parts that have been already shown; the vinous fermentation being promoted by the mucino-saccarine part, the aetoins by the flour, and the putrid by the gluten vegetable-animal; consequently, that from the different degrees or states of these several flages of fermentation the qualities or properties of good bread may in a great measure be derived. See Bread.

Besides this, it is found from actual experiment, as well as long experience, that those substances which abound most in farina, are the most expeditious in fattening different sorts of animals, as hogs, poultry, &c. and at the same time afford that for fat which is the most firm and solid in its nature; hence it is found necessary in most cafes to feed out animals of these kinds with some material that contains it in a pretty large proportion.

**FARINA Fecundina, in Botany. See Fecundation of Plants.**

Farina, Cape, in Geography, a cape on the north coast of Tunis. N. lat. 37° 42' W. long. 10' 15'.

FARINACIUM, in Rural Economy, a term which was formerly employed to signify the tillage of mead or flour.

FARINELLI, Carlo Broschi, Detto, an Italian opera-finger, whose voice and abilities seem to have surpassed the limits of all anterior vocal excellence, was born at Andria, in the kingdom of Naples, in 1705. He learned the first rudiments of music of his father, according to his own account, and finging of Porpora, who generally accompanied him wherever he went. In 1722, at the age of 17, he went from Naples to Rome, with his master, then engaged to compose an opera for the Albetti theatre, in that city; where, during the run of an opera, there was a struggle every night between him and a famous player on the trumpet, in a long accompanied by that instrument: this, at first, seemed amicable, and merely sportive, till the audience began to intermeddle in the contest, and to take different sides. After severally swelling out a note, in which each manifested the power of his lungs, and tried to rival the other in brilliancy and force, they had both a swell and a shake together, by thirds, which was continued so long, while the audience eagerly waited the event, that both seemed to be exhausted; and, in fact, the trumpeter, wholly spent, gave it up, thinking, however, his antagonist as much tried as himself, and that it would be a drawn battle; when Farinelli, with a smile on his countenance, bowing he had only been sporting with him all this time, broke out at once in the same breath, with fresh vigour, and not only swelled and shook the note, but ran the most rapid and difficult divisions, and was at last silenced only by the acclamations of the audience. From this period may be dated that superiority which he ever maintained over all his contemporaries. Here he continued with Porpora till 1724, when he first went to Vienna. In 1725, he performed at Venice in Metastasio's first opera of "Didone Abbandonata," set by Albinoni, After this he returned to Naples, where he performed with the celebrated female finger Tevi, in a serenata composed by Hasse. In the early part of his life he was distinguished throughout Italy by the name of "the boy." In 1726 he sang at Milan, in "Ciro," an opera set by the elder Cimi. In 1727, he performed at Bologna, with Bellacchi, in an opera set by Orlando. In 1728, he went to Vienna a second time; and afterwards returning to Venice in autumn, he sung with Pastina, just returned from England, in Metastasio's "Ernana," set by Porpora. Here he continued two years, performing in 1729, with Cesti and Nicoli, in "Smeralda Rinconocciata," set like-wise by Porpora, and in "Costanza," by Leo; and in 1730, with Nicoli and Cuzzoni in Hasse's celebrated opera of "Artaserse," in which he first appeared in England; and in "Idaspe," set by his brother Riccardo Brochi. Wherever he went his powers were regarded as miraculous; but he told the author of this article, that at Vienna, where he was three different times, and where he received great honours from the emperor Charles VI, an admonition from that prince was of more service to him than all the precepts of his masters, or examples of his competitors for fame: his imperial majesty CONSTEED to tell him one day, with great miflenfl and affability, that in his singing he neither moved nor felt still like any other mortal; all was supernatural. "Those gigantic strides, said he; those never-ending notes and paffages (see notes quie diflir- enent jnus) only in Fals Harries, and it is now time for you to please; you are too bashful of the gifts with which nature has endowed you; if you will to reach the heart, you must take a more plain and simple road." These few words brought about an entire change in his manner of singing: from this time he mixed the pathos with the spirit, the simple with the fulness, and by these means, delighted as well as admired every hearer. In the year 1734, he came into England, where every one knows who heard, or has heard of him, what an effect his surprizing talents had upon the audience; it was ecstasy! rapture! enchantment! In the famous air "Sun qual Nave," which was composed by his brother, the first note he sung was taken with such delicacy, swelled by minute degrees to such an amazing volume, and afterwards diminished in the same manner, that it was applauded for full five minutes. He afterwards set off with such brilliancy and rapidity of execution, that it was difficult for the violins of those days to keep pace with him. In short, he was to all other fingers as superior as the famous horse Children was to all other running-horses; but it was not only in speed, he had now every excellence of every great finger united. In his voice, strength, sweetnefs, and compass; in his style, the tender, the graceful, and the rapid. He possessed such powers as never met before, or since, in any one human being; powers that were irref- tellible, and which must subdue every hearer; the learned and the ignorant, the friend and the foe.

As general and indiscriminate praise would convey to the mind of a na?ve?leader no distinct ideas of the powers of this extraordinary finger, it will be necessary to discriminate the specific excellencies of which he seems to have been possesséd.

No vocal performer of the last century has been more unanimously allowed by prof?flional critics, as well as general celebrity, to have been gifted with a voice of such uncommon power, sweetnefs, extent, and agility. Nicoli, Secchi, and Carelli, gratificd the eye as much by the dignity, grace, and propriety of their action and deportment, as the ear, by the judicious use of a few notes within the limits of a small compass of voice; but Farinelli, without the assistance of significant gestures or graceful attitudes, enchanted and subdue his hearers by the force, extent and melhonous tones of the mere organ, when he had nothing to execute, articulate, or express. But though during the time of his singing he was as motionless as a statue, his voice was in action; that no intervals were too close, too wide, or too rapid for his execution. It seems as if the composer...
composers of these times were unable to invent passages sufficiently difficult to display his powers, or the orchestras to accompany him in many of those which had been composed for his peculiar talent. And yet, so great were his forbearance and delicacy, that he was never known, while he was in England, to exclaim, or manifest discontent at the inability of the band, or mislakes of individuals by whom he was accompanied. He was so judicious in proportioning the force of his voice to the space through which it was to pass to the ears of his audience, that a small theatre at Venice, though it was then most powerful, one of the managers of the opera complained that he did not own it, certain himself—"I am sure then," says Farinelli, "I shall lose my reputation without your being a gainer by it."

On his arrival here, at the first private rehearsal at Cuzzoni's apartments, Lord Cooper, then the principal manager of the opera under Porpora, observing that the band did not follow him, but were all gapping with wonder, as if thunder-stuck, defined them to be attentive; when they all confessed that they were unable to keep pace with him; having not only been disabled by affumblishment, but overpowering by his talents. This band was small, consisting only of Carbonelli, Mich. Chirill. Felling, Valentine Sow, afterwards fejerant-trumpet, and Mr. Veazan, a dancing-master, who was likewise a Ready and excellent concert player on the violin, and constant-ly employed whenever Carbonelli or Felling was the leader. It was from this worthy man that we had this anecdote.

There was not one of all Farinelli's excellencies by which he so far surpassed all other fingers, and affumblified the public, as his matchless voice, for which, by the natural formation of his lungs, and artificial economy of breath, he was able to project to such a length, as to excite incredibility even in those who heard him; who, though unable to detect the artifice, imagined him to have had the latent help of some instrument by which the tone was continued, while he renewed his powers by respiración.

With these talents he went into Spain in the year 177", with a full design to return into England, having entered into articles with the nobility, who had then the management of the opera, to perform the ensuing season. In his way thither he sung to the king of France at Paris, where, according to Riccoboni, he enchanted even the French themselves, who at that time universally shunh'd Italian music; but the first day he performed before the king and queen of Spain, it was determined that he should be taken into the service of the court, to which he was ever after wholly appropriated, not being once suffered to sing again in public. A pension of near 3000l. a-year was settled on him for life.

He said, that for the first ten years of his residence at the court of Spain, during the life of Philip V, he sung every night to that monarch the same four airs, two of which were composed by Halle, "Palo il folle," "Per quello dolce Amplefso," and "Ah, non l'afcamo no, boll idol mio," by Vinci: we forget the other, but it was a mixt which he used to vary at his pleasure. He was honoun red with the order of St. Jago by his first royal master. Of the manner in which he spent his time some idea may be gathered from what we have already related: the lovers of anecdotes might, indeed, be gratified with innumerable particulars concerning the effects of his amazing talents, if anecdotes were not below the dignity of lexigraphy; one or two, however, that do honour to his heart and natural disposition, we hope our graver and more critical readers will excuse.

It has been often related, and generally believed, that Philip V. king of Spain, being feized with a total dejection of spirits, which made him refuse to be heard, and rendered him incapable of attending council, or transacting affairs of state, the queen, who had in vain tried every common expedient that was likely to contribute to his recovery, determined that an experiment should be made of the effects of music upon the king his husband, who was extremely sensible to its charms. Upon the arrival of Farinelli, of whose extraordinary performance an account had been transmitted to Madrid from several parts of Europe, but particularly from Paris, his majesty contrived that there should be a concert in a room adjoining to the king's apartments, in which this singer performed one of his most captivating songs. Philip appeared at first surprized, then moved; and at the end of the second air made the virtuoso enter the royal apartment, loading him with compliments and carrefies; asked him how he could sufficiently reward such talents; assuring him that he could refuse him nothing. Farinelli, previously instructed, only begged that his majesty would permit his attendants to have and dress him, and that he would endeavour to appear in council as usual. From this time the king's diffidence gave way to medicine: and the finger had all the honour of the cure. By singing to his majesty every evening, his favour increased to such a degree, that he was regarded as first miniller; but what is still more extraordinary, instead of being intoxicated or giddy with his elevation, Farinelli, never forgetting that he was a musician, behaved to the Spanish nobles about the court with such humility and propriety, that instead of envying his success, they honoured him with their esteem and confidence. One day in his master the king's closet, to which he had at all times access, he heard an officer of apartments say, "If I ever curse you, and say to another that was in waiting, "Honours can be heaped on such scoundrels as these, while a poor soldier, like myself, after thirty years' serviet, is unnoticed." Farinelli, without seeming to hear this reproach, complained to the king that he had neglected an old valet, and procured a regiment for the person who had spoken so harshly of him in the ante-chamber; and in quitting his majesty he gave the commission to the officer, telling him that he had heard him complain of having served thirty years, but added, "you did wrong to accuse the king of neglecting to reward your zeal."

The following story, which is less serious, was frequently told and believed at Madrid, during the first year of Farinelli's residence in Spain. This finger, having ordered a superb suit of clothes for a gala at court, when the tailor brought it home, he asked him for his bill. "I have made it bill, sir, says the tailor, nor ever shall make one. Instead of money," continues he, "I have a favour to beg. I know that what I want is unreturnable, and only fit for monarchs; but since I have had the honour to work for a person of whom every one speaks with raptur, all the garment I shall ever require will be a song." Farinelli tried in vain to prevail on the tailor to take his money. At length, after a long debate, giving way to the humble remonstrances of the trembling tailorman, and atered perhaps more by the singularity of the adventure than by all the applause he had hitherto received, he took him into his music-room, and sung to him some of his most brilliant airs, taking pleasure in the admiration of his ravished hearer; and the more he seemed surprized and affected, the more Farinelli exerted himself in every species of ease and silence. When he had done, the tailor, overcome with excess, thanked him in the most rapturous
The death of Philip V. his favour continued under his successor Ferdinand VI., by whom he was dignified with the order of Calatrava in 1750. But his duty became less constant and fatiguing, as he perfumed this prince to have opera, which were a great relief to him; he was appointed sole director of those spectacles; and had from Italy the bell composers and figures of the time, and Metafàlio to write. He showed me in his house four of the principal scenes in Didone and Netetta, painted by Amico, who accompanied him first into England, and then into Spain, where he died.

When the late King of Spain ascended the throne, he was obliged to quit that kingdom, but his pension was full continued, and he was allowed to bring away all his effects. The furniture of his house was very rich, as it was almost entirely composed of the presents which he had received from great personages. He seemed very much to regret the being obliged to seek a new habitation, after having lived twenty-four years in Spain, where he had formed many friendships and connections that were dear to him; and it was a great proof of the prudence and moderation of his character, that in a country and court, where jealousy and pride are so predominant, he continued so long to be the king's chief favourite, a distinction odious to every people, without the least quarrel or difference with any of the Spaniards.

When he returned into Italy in 1761, all his old friends, relations, and acquaintances, were either dead, or removed from the places where he had left them: so that he had a second life to begin, without the charms of youth to attach new friends, or his former talents to gain new protectors.

He said that Metafàlio and he were twins of public favour. Their first acquaintance began at Naples, where Farinelli performed in Metafàlio's first drama, in "Angelica," 1733, and in "Dido," 1724; in "Siroe," at Venice, 1725; and 1726. They seem not to have met again till Metafàlio was settled at Vienna, where Farinelli was engaged three several times, and where they saw each other for the last time in 1733, from which period their affection continued with undiminished ardour to the end of their lives.

The letters of Metafàlio to this vocal phenomenon and worthy character are all preserved from the year 1742, to the last ufe which the poet made of a pen, in 1782. Nothing need be added here to his public professional character; but in the letters of Metafàlio, publifhed in the memoirs of his life, the numerous and impressive eulogies of that excellent and refined moralist, and judge of the human heart, exalt his private virtues and conduct through life to an uncommon pitch of excellence. During his residence in Spain, we were curious to obtain information concerning the life of this portentous performer: we had accounts from the highest authority of his modesty, humility, and benevolent propensities, during his splendid residence at Madrid, while in the meridian of royal favour, invested with wealth, honours, and influence, sufficient to excite every species of envy, hatred, and malice, in all the orders of society. Yet to be found were his intellects, fo fage and judicious his conduct, that he cannot to properly be said to have escaped the shafts of envy, as to have prevented their being shot at him. Of almost all other great singers, we hear of their intoxication by praise and prosperity, and of their caprice, influence, and absurdities, at some time or other; but of Farinelli, superior to them all in talents, fame, and fortune, the records of folly among the spoilt children of Apollo furnish not one disgraceful anecdote. In one of Metafàlio's letters to his Caro Gemello, (his dear twin,) as he always called Farinelli, he says, "the Spanish minister plenipotentiary, don Antonio di Azlor from your court is arrived, and pleases extremely here; not only my august patrons, but the nobility and the whole corps diplomatique. He has an agreeable serenitiues in his aspect, an opennes in speaking, and fo noble, courteous, and judicious an address, that we hope he will worthily and usefully sustain the character with which he is honoured. He is interrogated by every one concerning yourself, as all are solicitous about what is most dear to them; and all are extremely pleased with his answers. He affirms them that your prosperity has not in the least altered the sweetnes and moderation of your character. A rock, according to ancient and modern examples, extremely difficult to avoid; and much more amidst the favours, than the perfections of fortune. He has assured them that though elevated to such an enviable situation, you have not an enemy. To obtain forgiveness, (Metafàlio adds,) for such prosperity, I can easily conceive how wise, how disinterested, and how beneficent must be your conduct. I congratulate you on these inestimable characteristics, which are your own, and not the gifts of fortune; and I congratulate myself for having known and loved you, before you had given such illustrious proofs of your estimable and amiable qualities."

In a letter of the poet's to Farinelli in 1752, when at the zenith of his favour and fortune, he says, "I have seen, for a short time, count Ellerhaft, after his return from Madrid, and have found him full of you. He regards you as a hero, and has defined me to tell you so; which will oblige me likewise to love you more than ever. At this last affront I cannot help laughing; but I own, that to hear you thus praised, affords me the fame pleasure as if it was myself: for much do our old, true, and reciproc'd friendship seem to have united us together, and consolidated our interests. God preserve you, our dear Gemello, and inspire others to think as you do."

"What I intend to write to you, my dear friend, is what I think, not what I say; and I do not write all, lest I should be thought by those who are not acquainted with me one of the common worhippers of your fortune: which I only love in you, as an instrument by means of which you discover the good qualities of your heart; among which I must, for my own sake, enumerate the admirable coniquence of your friendship."

Again, in 1756, he says, "at length our noble and worthy Monfignor Migazzi, arch-bishop of Vienna, is arrived here from Madrid. I have put his patience to extraordinary trials, with my numerous and minute questions concerning your health, way of life, friendship for me, and the public approbation which you have so well contrived to merit. He went so far as to tell me, that, conscious of your heroic conduct in circumstances so peduncled, he might venture to caunalyze you without the fear of opposition. Figure to yourself, if you can, how sweet such music must be to the ears of your mult faithiful and affectionate Gemello."

There are instances of the strength of his head during prosperity; we shall give two or three examples of his fortitude, when "fallen from his high estate." In 1758, he lost his great patrons and judge of his worth and talents, the queen of Spain: and, in 1759, he comfort Ferdinand VI.
VI. who being succeeded by Charles III. his brother, the late king of Spain, who hated music, and would not suffer the sound of a voice or an instrument to be heard in his palace, ordered him to quit Madrid, and return to Italy; but not to his own country, Naples, whither it was his wish to retire; but from some caprice, never clearly explained, though his pension was continued, he ordered him to spend the remainder of his days at Bologna. Upon his first loss, Metastasio in condescension says: "The death of fo admirable a queen, and her royal comfort oppressed with grief for so irreparable a loss, are objects for a disconsolate servant, obliged, honoured, and full of affection and gratitude like yourself, that must inevitably plunge your mind in an abyss of defolation. I know not what to say to you, my dear friend, equal to what I feel for you. Yet I have no doubt but that you, who have seen the world how capable you are of reviling the flattering fumes of fortune, will know how to support adversity; and that your prudence will not wait for the alliteration of necessity, to manifest wisdom and Christian resignation." And on the death of his royal patron Ferdinand, in 1759, he begins his second letter of condescension in the following manner: "Yesterdav was delivered to me your letter of the second of August, from Villazzio; and though tintured with the gloomy colour reflected from the Stygian thicket, it was great consolation to me to find, that with your feeble state of health, you have had sufficient vigour to repel so tremendous a shock. The fatal news of your benevolent king having been delivered from his sufferings, arrived at Vienna four days before your letter. It is to be hoped that the melancholy fate in which he long remained without the least chance of recovery diminished the violence of a blow which must have been expected, and which delivered a poor prince from the painful existence in which he languished. And yet, with all these folded reasons, I judge, my dear Gemello, by the emotions of my own heart, what your must be: but I promise myself much more from your virtue than mine; because the examples of moderation with which you have so long furnished the world in the midst of the most intoxicating fumes of fortune, give us assurances of your meeting her frowns with equal fortitude. Be of comfort, my dear Gemello: insufficiency in human affairs is the universal condition on which we live, and every mortal knows by painful experience. No misfortune, however, can rob you of the pride of not suffering yourself to be seduced or dazzled by the blaze with which you were so long surrounded."

The death of his partial patrons not only deprived him of his importance at that court, but seems to have bereaved him of all comfort during the rest of his days. In a letter of Metastasio to him in 1763, we find the following tribute of his resignation to his fate. "I now begin to discover that my beloved Carloccio is as superior to the frowns, as he has hitherto been to the fumes, of fortune. I promis myself this heroism from you; and was certain that your greatest difficulty was knowing how to fet bounds to the tender excesses of your good heart, and gratitude. Now time and reflection have rendered you master of yourself, it is fit, my dear friend, that you should enjoy that sweet tranquility, which is so jolly due to your toils and conduct."

In 1764, "his guide, philosopher, and friend," says, "your last letter of the 5th inst, really confounded me. From the ferenity and pleasantry with which it is coloured from the beginning to the end, I conceive that you are at length arrived at the feter of wiping from your mind that cursed foot with which it has so long been discoloured. I congratulate you on your success, in an enterprise which borders on a species of heroism of which so few are capable. We have an infinite number of great men, who are venerated as models of knowledge and prudence, who have sunk under catastrophes much less violent than yours. Happines, therefore, attend my dear Gemello! who has proved himself as much superior in adversity as prosperity, and who knows how to estimate human felicity better than those who call themselves philosophers; and in no want of scholastic jargon to enable him to fland firm and motionless in every gulf of wind. Heaven blest, and keep you in this wise and placid state for at least half a century."

In 1771, in a letter to a Bolognese lady who had boarded of her acquaintance with Farinelli, he says: "your partiality, madam, for my dear Gemello, the cavalier Brofchi, is a new motive for the encrease of that esteem which I have always had for you: as his excellent deference affires me of the merit of those perfons with whom he is in habits of intimacy. And I envy you both that mutual enjoyment of each other's company, at which I can never aspire." And in 1779, in a letter to the same lady, the venerable bard says: "you have obliged me extremely my dear Signora Giocinta, by honouring me with the continuance of your correspondence, and affuring me of the affectation remembrance which my dear and refpefted friend fig. Carlo Brofchi retains for me, which I return with a mutual and molt complant recollection: I and esteem him as much as it is possible for a man to be loved and esteemed, who has so far surpassed all his peers, not only by his excellence in the charming art which he professed, but by the uncommon virtuous qualities of his mind, which have rendered him amiable, and admirable, in every situation into which fortune has thrown him.

We have dwelt with more pleasure on the virtues of this extraordinary vocal performer; as we fear they are more rarely found in musicians than great talents. Possessed of irresistible powers of pleasing, they must be regarded as spoiled children of nature and of the public; who in their vital voyage, "are not only ignorant how to fail before the wind, but how to tack, without losing their steeerage." However, if such splendid fortune as Farinelli's has happened to but very few mortals, there have not been wanting influences of great vocal powers being united with found intellects, prudence, and good conduct, of all which we may safely venture to say that Facherotti was eminently posessed.

FARINOLA, in Geography, a town of Naples, in Abruzzo Ultra; 11 miles S. S. E. of Terrano.
FARIO, in Zoology, a term for salmon when about half grown, after it is put the state in which it is called a fario, and before it is of the full growth.
FARIS, in Geography, a town of Peruca, in the province of Comis; 50 miles S. E. of Bittam.
FARLEE, a town of Bengal; 8 miles N. of Rangamatty.
FARLES, a river of North Wales, which runs into the irish sea; 4 miles W. of Cricketh.
FARLEY, in Rural Economy, is a term used formerly, in the well of England, to signify the money paid by tenants in lieu of heriot. It is frequently understood in some manors at Devonshire to be the half goods, as heriot is the half hold ye, payable on the death of a tenant.
FARLOE, in Geography, a town of Sweden, in the province of Schonen; 6 miles N. of Christianlads.
FARM, in Agriculture, a term which formerly signified a small messuage or cottage in the country, comprising a hofe, land, and other conveniencies, which was hired or taken by lease, either in word or writing, under a certain 8 yearly
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Yearly rent or charge; but which at present may be defined a certain portion of ground cultivated by the proprietor or tenant in different methods, according to the nature of the land, for the purpose of deriving profit from it. These leaves were differently denominated in different districts or places; hence, in the more northern parts of the kingdom they were frequently termed *tacks* and *fermehalls*; while in some parts of the south they had the title of *wicks*.

The word *ferma*, *farm*, or *farm*, in corrupt Latin, signified a place which was inclosed or flint in; whence it has been affected by Menage, that in some districts or provinces they term *elofeir*, or *elofare*, what in others is called *ferm* or *fares*.

By Skinner and Spelman the word *farm* is, however, derived from the Saxon term *farma*, *of* farm, which signifies *vita*, *food* or *provision*, as the tenants and country people annually paid their rents in victuals, and other necessaries of life, but which was afterwards converted into the payment of certain sums of money. Hence a *farm* was originally a place which furnished or supplied its owner or lord with provisions. The Normans likewise distinguished between *farms* which paid in kind, as in provisions, and those which paid in money, denominating the former simply *femes*, or *farm*, while the latter were called *blanche farm* or *white farm*. The latter of the above writers has likewise shewn that the word *ferma* anciently signified, not only what is now called a *farm*, but also a feath or entertainment which was given by the farmer to the owner, proprietor, or landlord, for a certain number of days, and at a certain rate, in consideration of the lands, &c. which he held of him. Thus in the laws of king Canute, the term *ferma* is by Lombard rendered *vices*; and we have likewise reddere *fermam unius notitii*, as well as reddere *nam dieo de farma*, which evidently denote provision for a night and day, the rents about the time of the conquest being all reserved in provisions. This custom is asserted to have been first altered under the reign of the first Henry.

There is a statute, the 21 Hen. VIII. cap. 18, in which it is enacted that no parson or spiritual person shall take *farms* or leases of land, on pain of forfeiting ten pounds per month, &c.

And by the 25 Hen. VIII. cap. 13, and the 32 Hen. VIII. cap. 28, no person whatsoever shall take above two *farms* together, in the same parish, under the forfeiture of three shillings and four-pence a week.

In considering the nature of farms, it is evident that there must be different farms, from the different methods in which they are cultivated or employed. Where the principal part of the land is under the plough they are termed arable farms; but where the fattening of cattle or other forts of live *stock* is more immediately the object, they are distinguished by the title of grazing farms; where the chief intention is the obtaining different sorts of animal products, such as milk, butter, and cheese, they are denominated milk, cheese, and butter, or dairy farms; and where the two syllables of arable and grazfs management can be combined, they are called mixed, or convertible farms. As nature must be had in order to render farms of any kind productive, the hill fort may probably, in general, be considered as the most advantageous. And in addition to these, where hay is the principal object, there are farms or hay farms; and where live *stock* is chiefly reared, cattle or *broad* farms.

Most of the ancient writers on husbandry, who lived in warm climates, or countries where the heat and moisture of the air had unfelt, and frequently very dangerous effects on the health of the inhabitants, were very particular in their directions for the choice of farms or estates, and of the spots whereon houses should be built, so as to avoid the inconveniences arising from the climate, or from the quality or situation of the ground. But though the temperate air which we enjoy in this island renders such directions less necessary, yet, as several places in it are sickly, and, as in the most healthy situations, many houses and villages are built upon the least healthy spots, it must be of considerable advantage to those who can make their choice to know what soils and places ought to be avoided; and of such as are already fixed to be acquainted with the means of correcting those inconveniences which cannot be totally remedied. The Romans had generally pleasure as well as profit in view, when they bought or fenced a farm, and therefore they laid it down as a rule, that no degree of fertility should tempt a man to purchase in an unhealthy country, nor the pleasanter situations in a barren one. "Buy not too hastily," said the wife Cato, "but view again and again the purchase you intend to make; for if it be a good one, the owner you see it the better it will please you. Examine how the neighbouring inhabitants fare; let the country it lies in be a good one, the ways to and from it good, and the air temperate; let your land, if you can choose your situation, be at the foot of a hill, facing the south, in a healthy place, where a sufficiency of labourers, of cattle, and of water, may he had; let it be near a flourishing town, the sea, or a navigable river, or bordering upon a good and well-frequented road; let the buildings upon your ground be strong and substantial; do not rashly condemn the methods of others." It is best to purchase from a good husbandman, and a good improver, where it can be done.

But, besides the healthfulness of the situation, three other things should be particularly attended to in the choice of a farm or estate; these are, the air, the water, and the soil. The air should be pure and temperate, the water wholesome and easily come at, and the oil rich and fertile. The knowledge of the healthiness of the air is, as lord Bacon observes, discoverable rather by experiment, than by reason or conjecture. To examine the moisture of the air before a house is built, wool, or a sponge, may be hung up in the place and afterwards compared with some of the same, exposed in the same manner, and at the same time in another place. According as they gain more or less in weight, the air is more or less humid. The air is liable to greater alterations from heat and cold, in some places than in others; and as that inequality in the air is an enemy to health, the most equal should be chosen. This is easily determined by the thermometer, and by viewing the situation of the place; for the intermixture of hills and valleys, though pleasing to the eye, may be held suspected as to the lengthening of life, because of the variations of heat and cold.

It may be added, that the ancients were likewise particularly attentive to the quality of their water, and to the ease of coming at it. They advised bringing into the farm-houses the water of such springs as never dried up; or, if there was no such spring within the farm, to bring running water as near to it as may be; or to dig for well-water, not of a bitter or brackish taste. If neither of these was to be found, they directed large cisterns to be provided for men, and ponds for collecting and retaining rain-water for cattle. They esteemed that running water to be the better for drinking which had its source in a hill; spring or well-water from a rising ground was deemed the best; well-water in the bottom of a valley was held to be filthy; and marshy or fenny water, which creeps slowly on, was by them rightly looked upon as the worst of all. That
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That water is known to be wholesome which has no mineral in it, is perfectly clear, has no taste or smell, deposits no slimy sediment, leaves no spots or incrustation when boiled in copper or brass vessels, and which boils pale in a very little time. As spring and well-water pass through beds of sand, gravel, or small stones, these clear it of all impurities, unless there be mixed with them substances which are soluble in water. If any mineral is mixed with the water, it is unfit for the farmer's use. If it be hard, it is thereby rendered unfit for washing, and some other culinary uses. This is the kind of water which gives flesh boiled in it a red colour. It should be boiled for a quarter of an hour, or, if beaten, for several minutes. If boiled in fast motion, the air rises in considerable quantity, and this rises and falls, and, as the liquid is boiling, it is heated to a high degree, and gives the flesh its red colour. It is observed by medical men, that in a pot boiling with fast motion, there are quantities of air which give a red colour to the flesh. If boiled in fast motion, there are quantities of air which give a red colour to the flesh.

And in respect to the goodness of the soil, it should be judged of from a minute examination and comparison of different circumstances, such as the appearances of the trees, hedges, crops, and different plants that are produced upon it, as well as from its particular nature and colours.

On the Proper Size of Farms.—In regard to the consideration of the proper size of farms, it may be remarked that it is not proposed to decide as to the precise number of acres which constitute what is generally denominated a proper fixed farm. The person who attempts to do so will, if unfounded by a late writer, be involved in difficulties from which he will find it impossible to extricate himself; while his hypotheses must be liable to many objections, as to evince, in the clearest manner, that without considering the subject in various points of view, it is impossible to form a general conclusion. This subject, which, though apparently simple, involves a great variety of particulars, may probably be best elucidated, by explaining how far large and small farms are advantageous or otherwise to the proprietors, the occupiers, and the nation in general. There is probably no point within the range of husbandry which has, however, caused more fervent altercation and disputes with theoretical agriculturists and speculative political economists, than that of the size of farms. By some it has been strenuously contended that they should be altogether small; while others have maintained, with equal pertinacity, that they should be large, and others again have supposed that they should be of various sizes, restricting the largest to a certain number of acres. But all such plans are obviously founded upon an impracticable notion. In a country where the capital and means are so various, it must evidently be of great advantage to have farms of very different sizes, both in respect to extent of land, and that of rent, or annual value; as, by this means, the honest and industrious labourer in husbandry may be properly accommodated, and by degrees become wealthy and independent; while at the same time the expert, ingenious, and improving cultivator, who possesses extensive capital and information, may not be disappointed in embarking in such undertakings of this kind, as may simply repay his superior skill, capital, and industry. The nature of the management of a district, as well as that of the soil, should likewise, in some measure, regulate the size of the farms. Thus, where sheep-walks prevail, or the grazing system is extensively pursued, they should be large; but where the plantation or orchard practices are followed, they should be small. Both in the still, wet, and hard dry clayey soils, the farms should be large, that the farmers may have sufficient strength to work them at the proper seasons, which is very seldom the case when they are small. But the free, deep, medium soils, which are wrought with much less difficulty, may answer well in small farms.

Large Farms.—It has been suggested by a late writer that if the introduction of improvements in cultivation, and the breeds of the different species of live stock, are objects of importance to the proprietors of the kingdom as individuals, large farms must be considered by them as beneficial. As individuals, also, they must experience other advantages from large farms. The extent of capital employed in stock- ing and cultivating these farms infuses a regular and prompt payment of the rents. Building and repairing farm-houses on such farms, although considerable at first, is not so heavy an annual charge as on small farms; while the expense of inclosing and sub-dividing does not amount to one-tenth part. It was fortunate, the writer thinks, for British farmers, as well as for British husbandry, that proprietors adopted the resolution of letting part of their estates in large farms. By that means men, possessing every requisite for continuing them good farmers, turned their attention to the cultivation of the soil, and the introduction of every improvement connected therewith; and, in very many instances, have not only been so successful as to maintain and educate their families in cafe and comfort, but also to acquire such fortunes, as to render them independent proprietors; a circumstance which must give sincere satisfaction to every liberal mind; as from the service they have done in promoting the interests of agriculture, they are well entitled to enjoy the fruits of their industry. In regard to the community large farms, the writer says, must be considered as favourable in several respects. On what farms, he asks, in Norfolk, have turnips been cultivated, and used to the greatest advantage? On what farms in the Camp of Gowrie in Scotland has the cultivation of grain been most successfully carried on? In Leicestershire, where have the greatest improvements in the different breeds of live stock been effected? In the counties of Northumberland and Berwick, where have improved breeds of stock been most generally united with skilful culture? Every person who has travelled through these districts, with a view of procuring agricultural information, must, he thinks, answer, On large farms.

It is from large farms also that the towns are principally supplied with the great articles of grain, fat cattle, and sheep of the best quality. And as farms of this size are kept in the highest rate of cultivation, of which the lands are susceptible, and managed with the fewest number of hands; the greatest quantity of produce that can be spared from the like extent of land needlessly goes to market. To the occupiers of large farms it is also chiefly owing that the supply of the towns in these indispensable articles is so regularly kept up. If these farmers could not afford to keep their grain and fat stock on hand, till those of the poorer tenants were disposed of and consumed, the markets would either be over-stocked at particular seasons, and entirely empty in others; or, what is equally bad, the articles would get into the hands of a few dealers, who, by mutual consent, might raise the price to any extent they pleased, notwithstanding any acts of parliament against foreshalling, that could possibly be framed.

There is one particular description of farms which ought to be taken notice of here; these are in some places called Leafy Farms, in others, Grass Farms. Many farmers rent one or more large farms in different parts of the country, which are managed by an overseer. These are, the writer conceives, for the interest of the proprietor, because he generally receives a higher rent than could be afforded, were the farmer's family to be maintained from the profits of any of them alone; a great proportion being also allowed to remain in grazfs, the lands must be in an improving state. The farmer, after paying the extra rent, and the wages of
an overseer, still retains that proportion of profits which renders the renting of such farms an object to him; but, when it is considered that the farmer's close attention to minute particulars in the management of a farm is absolutely necessary to make it to the highest degree profitable, it is by no means clear, that the greatest produce which such farms are capable of yielding goes to market. The great, and indeed the only solid objection against large farms is, in his opinion, the consequent depopulation of the country. This, it will be generally acknowledged, is a most serious evil, and ought to be guarded against as much as possible. The remedy, however, in Scotland, it is conceived, is easy, and in many places adopted; namely, by building cottages on the outskirts of the farms, and hiring ploughmen who are married, and have families. These men are allowed grafts for a cow, and a small quantity of ground for cultivating grains, potatoes, and garden-fluff, in part of their wages. Were this plan generally introduced in both kingdoms, the grand objection against large farms would, the writer conceives, be in a great measure removed; the defecrtion of inhabitants would, no doubt, be changed, but the population would suffer no material decrease, and, at the same time, nearly an equal quantity of free produce would find its way to market, as in any other case.

The intelligent author of the corrected Report of the County of Chefter likewise contends for the superior advantage of large farms on the following grounds. Twenty or thirty acres of land cannot, says he, in the nature of things, furnish full employment to a farmer; nor is the profit which they afford by any means adequate to the comfortable subsistence of a family: a man, therefore, who enters upon a farm of this description, must either have some other occupation, to which he directs a great share of his attention; or must unavoidably be subjected to poverty, and all its concomitant difficulties. In either of these cases, the disposition of the land cannot but be regarded as unfa vorable to the general interests of agriculture; in the former, farming being made an object of secondary consideration, and frequently being very imperfectly understood, the cultivation of the land is seldom carried to its practicable length, and, consequently, a certain proportion of produce is virtually lost to the community; in the latter case, the evils resulting from a farm of this description are still more decided in their nature; since it will be generally admitted that no species of occupation can be beneficial in its consequences to the country at large, which is not to the individual immediately concerned in it. The same reasoning will apply equally to farms of forty or fifty acres; wherever the extent of land is not sufficient to furnish full employment to the farmer, and a comfortable subsistence to his family, a certain portion of personal exertion must necessarily be lost, and the consequences must be unfavourable, whether considered individually, or in a national point of view.

Another serious objection to small farms may be grounded on the difficulties they oppose to general improvements in agriculture. A farmer, entering upon thirty or forty acres, very frequently with a high rent, and little or no capital, cannot be expected to make any material improvement on his land, or to attempt experiments in cultivation, which are probably, expensive in the first instance, and uncertain in the results they may afford. All that he can do is to pursue the old-beaten track; to force out of the ground the payment of his rent, and a bare subsistence for his family, and fortunate may he esteem himself if he succeeds so far as to do this. On the other hand, the man who farms a considerable extent of land can pursue with vigour any new modes of agriculture that appear likely to be attended with beneficial effects; the possession of a competent capital enables him to undertake, and put into execution, any improvements of which his farm is susceptible, till by these means his lands are brought to the highest state of fertility. The opportunity which is afforded him, of making one department of his farming economy subservient to another, is an additional advantage which the farmer on a small scale cannot carry into effect to any great extent. The latter too much necessarily depend on his land a quantity of capital greater in proportion than is required in a farm of more considerable size; he must have his cart and horses, his plough and his harrow, and every other agricultural implement, as well as his neighbour, though he has only thirty acres, and his neighbour eighty or a hundred. Reverting then to the well-established, and, indeed, self-evident axioms in political economy, that capital is most advantageously employed, when, with a given quantity, the largest proportion of produce is the result; it seems scarcely to admit of a doubt, that large farms are, in this point of view, greatly more beneficial to the nation at large, than those of small extent only.

"The principal objections to large farms are, he says, founded on the tendency, which, as already noticed, it is asserted, they have to diminish the population of the country, and to increase the price of provisions. It is obvious, however, he thinks, that both these objections cannot stand their ground at the same time. If the population of the country be diminished, while the produce of the ground is increased, or even while it remains in point of quantity, it is clear, that no increase in the price of provisions can take place; on the contrary, it would be natural to expect a very considerable reduction in this respect. As these objections against large farms may, however, be urged individually, it is proper that a distinct answer should be given to each of them. With respect to its influence on population, it cannot be denied that the consolidation of several small farms into one of larger extent might have the immediate effect of throwing a number of individuals out of employment; many of whom, from the inadequate demand for labour of other kinds in the country, would be necessitated to have recourse to emigration. But this effect could be of only temporary duration. If, in consequence of the diminished number and increased size of farms the improvements in agriculture became more extended, and its general state more flourishing, it can scarcely be doubted that the ultimate effect in this change in the disposition of the land must be favourable to the population as well as to the prosperity of the country. The immediate effects of the adoption of improved modes of cultivation, and of the increased quantity of produce from a given proportion of capital, must be a diminution in the price of provisions. As a necessary consequence of this the price of labour must likewise be diminished; or, to speak in more general terms, an increased value would be given to the circulating medium; a circumstance highly favourable to a country, as it regards its commercial and manufacturing connections with other nations. The equalising nature of commerce would, indeed, in process of time, restore this value to its accreted level; but the impulse which had been given, meanwhile, to industry of every kind, could not fail to infuse internal prosperity, and, consequently, an increase of population to the country. If this reasoning be accurate, there appears, says the writer, no grounds for doubting that the enlargement of farms, to a certain extent, at least, would be productive of essential benefit to the real interests of the nation; a trifling diminution in population might, perhaps, be the immediate result.
result of the measure in question; but that the ultimate consequences of its operations would be injurious in this respect does not appear probable.

"The objection which has been urged against large farms, as tending to enhance the prices of provision, seems equally void of validity. The grounds of this objection are, that, by the enlargement of farms, the competition which exists between small farmers would be in a great measure lost, and a spirit of monopoly introduced in its stead. In answer to this, it may be sufficient to ask the simple question, why not this competition, esteemed to advantageous to the country, take place among farmers who hold two, three, or four hundred acres of land, as well as among those who hold thirty or forty? That this is contrary to experience the writer can by no means allow. Wherever monopoly has been the immediate cause of an unusual high price of corn, or other necessaries of life, it must, he conceives, have been practised on a much larger scale than could be done by any combination of farmers in the country. In fact, a very slight consideration must prove the futility of any objections to large farms vested on these grounds. Supposing, for the sake of argument, that the farmers in one county or district should combine to keep their flocks out of the market, and thus to raise the price of provisions; is it at all consistent with probability to suppose that the farmers, in the neighbouring districts, would favour this scheme, by retaining their individual flocks; on the contrary, is it not more likely that they would immediately come forward to supply the deficiency in the market, and thus counteract the designs of their more avaricious neighbours? Indeed it appears a point so clear, that the same competition of interests must exist among large as well as among small farmers, that the writer apprehends no conclusion can be deduced from this circumstance which will not apply with equal force to both cases. If then this competition renders provisions cheaper where the farms are small, will it not have precisely the same effect where they are of large extent? And does it not appear highly probable, that a very considerable diminution of the price of provisions would be the consequence of the general enlargements of farms in the kingdom? This, as was stated before, must, in the natural course of things, be the immediate effect of improved modes of cultivation, and of an increased quantity of produce from a certain given expanse of capital." The able writer does not here by any means contend for an indefinite extension of the size of farms; but merely suggests that the size of three or four hundred acres is superior, in point of advantage, to individuals and the country, to those of from thirty to sixty acres.

Small Farms.—It is contended by the author of the above writers that these are, no doubt, advantageous to the proprietors, in so far as the greatest number of British farmers are possessed only of slender capitals; and therefore, when small farms fall out of lease, several candidates immediately appear. The operations on the farm being for the most part conducted by the farmer’s own family, the expense of hired servants is saved, and he is thereby enabled to give a higher rent than could otherwise be done, without changing the imperfect system of agriculture, too commonly practised on farms of this description. The advantages in favour of the proprietors are, however, probably fully counterbalanced by the imperfect modes of cultivation above alluded to; the additional expense to which they are subjected by upholding farm-houses on an estate let in small farms, to which must be added, the very great extra charge which must unavoidably be incurred in inclosing and subdividing an extensive tract of land into small fields. It is, no doubt, for the interest of such tenants, that there should be a great number of small farms. The limited extent of their funds, and their knowledge and influence in the scale of society, would put it totally out of their power to embark in large undertakings of this nature; and if all proprietors were to adopt the resolution of letting no farms under a certain size, then people, as often happens, would be forced to turn their attention to some other employment, by which they could maintain their families. In a national point of view, small farms are, the writer thinks, undoubtedly advantageous. Large cities and towns are considerably diminished to the increase of population, and would, in time, be in a great measure without inhabitants, but for the constant and regular supply which the country furnishes. Small farms are not only in favour of population, but of the most valuable part of population; as, in consequence of the share of education which many of them obtain, the children of such farmers become valuable acquisitions to the artificers and manufacturers. If, says the writer, small farms were entirely abolished, a great part of the occupiers must retire to towns, and engage in some branch of manufactures. At the commencement of every war our manufactures receive a shock from numbers of hands being called off to serve their country in our fleets and armies. Were this supply to be drawn chiefly from the towns, which in this case would certainly happen, what then would be the fate of our manufacturers, that great prop of national prosperity? In a word, it is owiag, in no small degree, to the distribution of so large a share of the country into small farms, that the proper equilibrium of population between the towns and the country necessary to be preserved, is maintained. It is true, that owing to the number of perfons of which the families of this class of farmers are generally composed, and the imperfect manner in which the lands are too frequently cultivated, a very small proportion of the great article of bread corn goes to market. But the no less necessary articles of milk, poultry, eggs, and, in many cases, fuel, are furnished to the inhabitants of the towns and villages in much greater quantities from half a dozen of small farms, than from one of six times the extent. To this lift may also, the writer thinks, be added butter and cheese, with a few exceptions only, where dairy-husbandry is practised on a large scale. It would, the writer conceives, be extremely difficult to determine which of the sizes of farms before mentioned are in every point of view most beneficial. There is, however, as has been already noticed, no occasion to hesitate in deciding, that a variety in the size of farms is not only for the interest of all concerned, but absolutely necessary for the prosperity of the state. Were the farms all small, the population of the country would exceed the due proportion of the towns, and the quantity of provisions which it would be necessary to import would be immense. If the country was wholly divided into large farms, and unwarmed ploughmen principally employed, as is the case at present, the towns would be overstocked with people; and unless the prices of cheese, butter, milk, eggs, poultry, fuel, &c. were advanced, so as to make it an object to that description of farmers to send it to market, a very scanty supply would be furnished. The diversity in the size of farms in the island is, says the writer, no doubt in favour of, and must be agreeable to, the farmers; for, as they differ in knowledge and enterprise as much as in the extent of their capitals, they will naturally consider that farm as of the most proper size which is upon the whole best fitted to their particular circumstances and situations. Farms of the largest extent, the management of which a farmer is able himself minutely to superintend, must necessarily prove the most profitable; therefore, were the
the knowledge, enterprise, and capital of farmers all alike, large farms would be considered by them as of the most proper size. There is, however, no view of the subject, by which it will be found that any one size of farms would be generally advantageous. On the contrary, it is clear, the writer thinks, that the greater variety there is in the extent of farms, provided that variety is general over every district in Great Britain, the more extensively will the general interests of the nation at large be promoted and brought forward.

In considering the controversy respecting large and small farms, Mr. Marshall remarks, that those who are in favour of the first are chiefly men of public spirit, who have turned their attention to agriculture; and having found, or perceived, that farms of magnitude, conducted by men of judgment, spirit, and capital, abound in corn and cattle of the highest qualities, have concluded, he thinks, without any further examination, that all farms should be large. Those supporting the latter position, with equal pretensions for the public good, confide, it supposes, of minor gentlemen, the clergy and other professional men, tradesmen, and others in middle life, who live in towns; and who, finding the prices of poultry, eggs, and other good things, greatly enhanced of late years, imagine that the modern enlargement of farms must be the cause, conseqently call out loudly for a division of large farms; in order, it may be inferred, that articles of luxury may become plentiful; not regarding, or perhaps not knowing, what an expenditure of poor men's food is occasioned by the rearing and fattening of poultry. The fame barley, or other grain, which has been used in rearing and fattening a fowl, to supply one dish of an epicure's dinner, would have furnished a labourer's cupboard with bread for several days. But admitting what is obvious, that farms of magnitude, cultivated by wealthy and skilful men, furnish the market with a greater proportion of the common necessaries of life, than small ones in the hands of poverty and ignorance, it is but common prudence to examine into the effects which would follow a general enlargement of farms, to be managed by wealthy men; and to conceive how the markets would be supplied, under such a regulation, before it be carried into effect. If at present (1801), when the country contains farms of all magnitudes, and cultivators of all descriptions, there is a general cry against farmers, for keeping back their corn from market, what evil and outrage might not be expected were all the lands of the kingdom in the hands of the wealthy? If the prices of grain after harvest should not meet their expectations, they would, in consequence, defer to thrench out more than for their own use. And although they might have cause of repentance the envious farmer, this would not relieve the difficulties of the famished poor in the mean time; while, on the contrary, were all the farm lands of the country in the hands of the needy, the reverse would be the consequence. Presently after harvest, the produce would be hurried to market too fast for the consumption, and the surplus would necessarily fall into the hands of dealers, who, besides referring on all occasions an allowable profit, would have it in their power to fix their own prices during the summer months. Of course either of these extremes would be productive of serious evil. What the community require, with respect to farm produce, is to have the markets regularly supplied by the growers, the immediate producers, whether of vegetable or of animal food; without its passing through the hands of middle men unnecessarily. Hence it is evident, that to obtain a regular supply of the corn market by the growers themselves throughout the year, cultivators of different descriptions are requisite; needy men, who want an immediate supply of money, after harvest, to pay servants' wages and Michaelmas rents; men without affluence, who thresh out their corn in the winter months; and opulent, purse-pride, speculative men, to supply the markets during summer and early autumn. And this most defirable order of things the country happily enjoys at present in a considerable degree. Nay, even admitting that the higher classes, who reside in towns, are entitled to the indulgence of luxuries out of the produce of lands, we still perceive the propriety of a gradation of farms; insomuch as it furnishes large farms to feed the poor, and small ones to pander the rich. Though, in a general view of the country in this point, no great alterations are requisite; yet, when examined in detail, it admits of some improvement. There are districts which abound too much in small farms, others in large ones, and some in farms much too large for accurate management in any way. And if the subject be viewed in the light of good government, and the permanent welfare of the country, a similar gradation in the sizes of farms appears to conform with right reason. The tenantry of a country may be said to occupy the wide space in society which intervenes between labourers and men of landed property; and surely they ought to form a regular chain between them. But make the farms of the country either uniformly large, or uniformly small, and a number of links would be wanting. In the former case, particularly, a wide breach or chasm would be formed, a void space between a numerous peasantry and their petty lords; a state of civilized society this, which has no foundation either in reason or found politics, which require a regular gradation from the peasantries to the prince, and from the highest to the lowest in society; such a one as we fortunately find in this country at this time. And viewing the subject in a moral light, the present order of things appears to be nearly right. If farms were either uniformly large, or uniformly small, industry, frugality, and emulation (the fine senses and nerves of society,) would, among the lower classes in agriculture, lose their stimulus. If a farm servant or a labourer saved a few pounds, or had fifty or a hundred pounds left him, he could not employ them in his own line of life. He would either dissipate them, live on them as an idler, or carry them into some other line of business. Whereas at present, at least in districts in which farms of the smaller sizes still abound, there are many instances of servants of the lowest order rising to affluence, merely by the help of their own industry, frugality, and a natural spirit of emulation, cherished and led on by the gradation of farms.

But as large and small are merely comparative terms, "the extent of largeness, or greatest size, is the chief consideration; and this depends, in some measure, on the nature of the lands to be occupied, and the particular plan of management to which they are subjected. For it may be safely assumed, that no man ought to occupy more land than he can perdonably superintend. But in a district applied to sheep-walks farms of size are required; especially in a bleak or open country, where they require a constant attendance. A shepherds will take care of two or three hundred sheep as well as of a smaller flock. And an active sheep farmer, who knows his business, may well superintend several shepherds. Hence, in a passage of country applied wholly or principally to sheep-farming, individual holdings of more than five hundred pounds a-year (estimated according to the present value of money) appear to be politically admissible. Also in marsh land districts, applied to grazing, farms of magnitude may be admitted. The occupier in this, as in the former case, has only one object; and like a manufacturer of a particular article, or a man conducting one particular branch
of trade, he may extend his business to almost any limits. But, that in districts and situations in which the arable and
graz-land management unite, or ought to intermix, the case is
very different. For here not only markets, and the man-
gagement of stock of various kinds require attention, but
the seasons, or even a shower, may frustrate the best-laid plan,
and render the master's presence necessary to accurate man-
gagement. Here servants, and workmen of various employ-
ments, working animals, and implements, call for hourly
attendance in the field; while the different departments of
the house-stat! demand almost constant superintendence, equa-
ly to guard against negligence and dishonesty; in the winter
season more especially; to see that every grain of corn, and
every handful of fodder, is applied to its proper use; and
that no waiste, even of manure, is suffered to take place.
During the spring and summer months the corn farmer's
time and attention are more required in the field; to see
that every perch of ground he occupies is applied to some
profitable purpose, or is put under a course of preparation
for future crops; as well as to defend exciting crops from
enemies, whether animal or vegetable; to protect them
equally from domestic flocks, vermin, and weeds. In harvest
his constant and active exertions are called for; not only
to preserve his ripened crops, as much as in him lies, from
injury by the weather, but from spoil and waiste, by the
carelessness of workmen in the various operations which
they must necessarily undergo. And in autumn his most
ferious thoughts are wanted to look forward to the general
management of the ensuing year. All those attentions, and
innumerable others, the public have a right to expect from
the occupiers of lands, in a country whose appropriated lands
have been found by many years experience to be insufficient,
under the present imperfect state of agriculture, to supply
its inhabitants with the common necessities of life. This,
feeling the weight of care and forethought which every suffi-
cient husbandman has to fulfill, we may venture to conclude
that there are few men who have attention and activity
enough to manage politically more than five hundred acres
of land, in a state of mixed cultivation, and worth, according
to the present rental value of lands, five hundred pounds a-
year; even though they lie compactly round one central
farmery. It is not here meant that there are few men who
are able to manage more than good, £-year with profit to
themselves. Many a man gets rich with three times the prop-
erty under his care; and lying perhaps in three distinct
farms. But no wonder, for he may be laid to be receiving
three men's incomes, with only one family to maintain. If,
through the inaccuracies and inattentions of management, he
lose even half what two other occupiers would have gained,
still he is doubling his own income, by holding three instead
of one farm. He gets two profits, and the community
loose the third."

It is further supposed that a farm of good, £-year, which
is composed of inferior lands, as those which are worth ten
shillings an acre, is too large for one man to manage politi-
cally. A thousand acres lie too wide for one set of farm
offices. The great length of carriage of crops and manure,
and the travelling of plough-teams and workmen of every
description to distant grounds, occasion a waste of labour,
beside the waste of ground by lengthened roads and drift
ways, and the injury done to flock by a length of drift.
And no man can superintend two home-fleets with political
accuracy. But to excite emulation, and to encourage men
of capital, education, and spirit, to enter into, and persever-
ance in the profession; to lead its higher departments, and take
the lead in practical improvements, a small proportion of
corn farms of five hundred pounds a-year may be politically
eligible. It may be added that the lower extremity termi-
nated in the cottage and its cow ground; which may be set
down at five pounds a-year. This, however, is a fort of
farm which, like that of five hundred pounds a-year, ought
to be kept within bounds as to number, this being of the
two the least political: unless as the lowest step of the lad-
er of emulation. Thus, in a public light, it appears that
the sizes of farms on lands of good quality, and adapted to
mixed cultivation, ought to extend from those of five pounds
to those of five hundred pounds rental value. But that the
proportional number towards each extremity ought to be
small. For to the writer's mind it appears evidently, that
it is from farms of the middle sizes, as those of one to three
hundred pounds a-year, the community receive the great-
proportion of the common necessaries of life. It is chiefly
among the cultivators of farms of these sizes that we find
the three principal requisites of good husbandry, namely,
capital, skill, and industry. On farms below these fizes, the
first, and frequently the second, is wanting; and on those
of higher magnitude the last is apt to be deficient.

On Laying out Farms.—In this business there is consider-
ably more difficulty than is generally supposed. It is
flated by a late able writer on landed property, that much
depends on the natural and acquired circumstances of the
different lands or estates. The situation, the soils, the pre-
rent state of occupation or system of management, and the
present fize of the farms, require to be maturely studied,
and duly weighed, before any effective steps can be safely taken.
It is an arduous task to alter the arrangement or general eco-
nomy of an estate with profit and credit to its proprietor;
even when the whole is rented at will, or from year to year.
Where leaves exist, difficulties are increased; and the day
of improvement is placed at a greater or less distance.
Nevertheless, a man who has at his heart the permanent good of
the estate which he possesses will look forward, and concert
plans for its future improvement and welfare. And as an
estate which is judiciously laid out into compact farms of
suitable fizes, is worth considerably more by the year than one
of the same intrinsic value, whose lands lie scattered and
intermixed in fizes of improper fizes, he will not fail to set
out a plan of reform, which requires nothing but attention
and perseverance to be accomplished. The first
attention required is to study its natural character, to view it as
in a state of nature, and without inhabitants; marking the
elevation and turn of its surface, whether it consists of moun-
tain, upland, vale, or water-formed lands, and ascertaining
at the same time its soils, sub-fractions with regard to their
ab-
FARM.

well as for the use of yard flock; with some permanent grass ground below the yards, to receive the overflown waters of the dung basins, that nothing of manure may escape or be lost from the premises. Where lands lie in a shelving situation, it is generally desirable to have the home-fall near the midway of the slope. Thus gaining a central situation, and having lands above as well as below the yards; so that neither the whole of the crops, nor the whole of the dung, may require to be drawn against the hill at a busy season. A dip or shallow valley, with a natural stream falling down it, and with lands in the lower part of it, which are capable of being converted into watered moving ground, is in general a desirable site for a home-fall.

However, when an estate is already inhabited, and laid out into farms, with the farm-faits fixed, and the buildings substantial, it requires much thought and some time to make great alterations, either with credit or profit to its proprietor. Where the lands of different farms lie scattered and intermingled with each other, as they too frequently do, either through circumstances that were unavoidable perhaps at the time they took place, or through improper indulgences to favourite tenants; or through the ignorance or negligence of managers; or the less pardonable design of those who have had an interest in the situations which the intermixture of lands seldom fails to create; something may generally be done towards lessening or remediating the evil; even where parts of an estate are under the temporary alienation of leaves; through the means of amicable changes between tenants. This is a species of improvement which ought to be sedulously attended to by the managers of estates, as lands which lie compact and convenient to the home-fall are worth considerably more to an occupier than those of the same intrinsic value, which are scattered at a distance, so that by this fort of exchange a two-fold advantage comes home (or will come at the expiration of the lease or leaves) a clear income to the proprietor; besides rendering the management of the estate more easy and pleasurable. And in cases where the entire estate is rented out from year to year, the consolidation of farms may be effected with less difficulty, and the two-fold advantage be immediately enjoyed.

It is advised, in order to conduct the business of a general arrangement, regulation, or reform of an estate which is already laid into farms, with full effect, to study it as a blank, in the manner as if it were in a wild or unappropriated state; to ascertain its natural or most eligible home-faits, and the lands which, by situation, belong to them; then to examine the existing farm-faits, buildings, roads, drift ways, and inclosures, and by duly considering the aggregate of facts thus added to, to endeavour to make out such a plan of improvement as will secure the greatest clear and permanent rent, at the least expense, without driving from the estate the devolving part of the existing tenantry. And a plan of reform being fixed, let the intended farms be outlined and coloured on a general map of the estate; and this done, let each be separately delineated on a small map fitted to the pocket, that the proposed arrangement may be continually under the manager's eye, whether in the business-room or upon the estate. This method of conducting a plan of reform, which has been repeatedly experienced, is equally applicable to an estate which is wholly at will, and to one which is partly under lease; every favourable opportunity being taken as the leaves fall in, to carry the plan into execution, always keeping it in view from the time it is formed; and, in consequence, letting down buildings, or repairing them in a temporary way, where they will not be wanted, and keeping them up, in a substantial manner, where they will be eventually required. And where the farms are too large, or the farm-faits very improperly placed, but where the existing buildings are yet in a substantial state, it requires to be calculated whether the increase of rent by the proposed alteration will pay fix per cent. for the money required to be laid out in making it, taking, however, into the account, the superiority of new buildings. The creating of an entire range of farm-buildings, with the requisite appendages is an undertaking which, in private economies, demands mature consideration. There are cases, however, in which it may be effected with profit, and many in which it may be done with credit and respectable to those employed. Where the farms are too small, suitable aggregations should be made, and each of these be coloured on the maps as one farm, the alterations being afterwards made as circumstances may require; preference being given over to the most deserving managers, and every fair opportunity taken to diffuse theunderring. By this easy means, giving the most impressive lesson on good management to the tenantry of the estate, the best effects are produced in this way.

But it is to be further remarked, on the subject of laying out farm-lands into suitable tenements, that although compacts of form and centrality of home-fall are always desirable, they are not the only objects to be attended to. The specific qualities of the lands of the estate are another subject of consideration. If the lands of an estate are naturally adapted to different purposes, as cool agrounds, fit for perennial moving grounds, especially if they can be profitably watered, and dry uplands that are suitable for mixed cultivation only; a portion of each ought, according to long-established ideas, to be included in every farm; a principle this, however, which is generally destructive of the compacts of form. And a more modern opinion is, that perennial farms-stands are not at all necessary to profitable farming, cultivated herbage and roots being equal to all the wants of modern husbandry. Nevertheless, where a fit of meadow and pasture grounds can be properly united with arable lands, it will generally be for their mutual benefit to unite them. This, however, is to be done by a general arrangement, not by making up disjointed farms with lands lying in distinct and perhaps distant parts of a parish, as we often at present see. For the extra carriage of cows and manure, or the unnecessary and injurious drift of flock, and the waste of manure thereby incurred, together with the difficulties arising from flock being kept at a distance from the eye, and the time lost in pasting, on every occasion, between distinct parts of a scattered farm, eventually fall on the proprietor. In fact, where an estate consists of arable lands of different subfrata, so that some parts are retentive of moisture and others not, it ought to be the aim of the planner to include portions of each in every farm, in order that each occupier may have a regular succedence of employment for his teams in a moist season, and in order that, whether the summer proves wet or dry, he may not be deftite either of grass or herbage. And in districts of a mixed nature of irata, where a variety of lands are found, this, by due attention, may not unfrequently be done, without much deranging the compacts of the farms, or the central situation of the home-faits.

In laying out the particular fields of a farm, it must depend greatly on the situation, foils, and the system of husbandry to which they are the most fitted. There are, however, certain points or principles that deserve attention in the business. The great benefit of having a water-meadow below the farm-fait has been already seen. But where a sufficient breadth of land cannot be commanded in that situation,
Farm, to become an object as a moving-ground, to be watered superficially, the yard liquor may be expended with profit on a smaller plot, converted to a farm garden ground, to be watered by means of parallel trenches, formed across the slope or descent of the ground to receive it, in the manner described below, thus conveying the nutritious particles which have escaped from the dung-yards immediately to the fibrils of the plants while growing, or to the base of the foil into which they are required to strike. And on every farm in which there is not a sufficient of watered garden ground, a garden field of some acres for the culture of green herbage and roots with the plough, for horses, cattle, and swine, as well as for culinary purposes, ought to be laid out near the farm-yard. A paddling paddock or two near the house is likewise a requisite appendage to a home-fiel: as a faddle-horse paddure, and as a hospital ground for fick or ailing flock.

And dairy-gounds, where the dairy is a principal object, ought, in like manner, to be laid out near the house, and open into the lobby, green, or milking-yard. But the meadows or perennial mowing grounds may be laid out at a distance with better effect, as it is always convenient to flack hay in the field of its growth; and if not wanted near the spot, it may generally be brought home, with less inconvenience and expense, at almost any other time than amid the blude and hazard of hay-harvest.

Arable lands, on the contrary, cannot lie at a distance with propriety; as, in this cafe, not only the crops and manure require a length of draught, but the time taken up by the plough-teams in passing to and fro, is a further inconvenience. Nor should the palture grounds for working flock, whether oxen or horses (where these are paddured), be far from the home-flail. But those for flare cattle and sheep may lie at a distance with less impropriety. Woodlands, such as coppice-gounds, may also lie at a distance. The writer thinks it clear, from this fort of distribution requiring much of the land contiguous to the farm-field, that there is an impropriety in very large farms, and an advantage in farmeries being centrically situated.

In the buncife of laying out arable lands, the number of fields must contantly be regulated by the plan of management proper to be pursued, and by the size as well as the nature of the lands of the farm to be laid out. Where, as will be noticed, lands of opposite qualities, as those which are retentive of moisture, and those that are absorbent and open, are contained within it in sufficient quantity, two fets of arable fields should be laid out, that the works of tillage and fermentation may not be liable to be interrupted by a shower, and that the flock of the farm, be the season wet or dry, may not be defirled for paddure. Likewise on a large farm, the lands of which are uniformly absorbent, and consequently adapted to the turnip husbandry, it is proper to have more than one set of arable fields, in order that a sufficient choice of contiguous or near fields may be had, over which to distribute the turnip crop (where this mode of husbandry is practised) and thereby prevent an unnecessary length of carriage. But on rich retentive lands, in situations where an ample supply of extraneous manure can be procured, or where such lands are united with marsh and meadow grounds, to furnish a sufficiency of hay and paddurage, without the attendance of the arable lands, one set of arable fields may be sufficient; four or five fields or divisions being all that are necessary, at least on a small farm. But that on the generality of English farms, on which a number of manure-making flock are necessary to be supported by the arable lands, a greater diversity of fields is required; as in this case it is necessary that the lands should lie some years in a state of cultivated herbage, between each course of arable crops, according to its nature, and the time it will lie profitably in a state of grases, as two, three, four, or five years. Consequently, if the arable rotation occupy the land four years (taking three crops of corn with a fallow-crop, or fallow intervening), the number of arable fields required for one set will be six, seven, eight, or nine. However, much depends in such cases not only on the nature of the land, but on the calcareous and other extraneous nature, which may be procured, in greater or less quantity, in almost every situation of a farm.

It may be observed, that the sizes of arable fields may seem to be given in the number. But on a large farm, in a blank situation, and on which it is proper to keep a numerous flock, it may often be found requisite to subdivide the arable divisions, not only for the sake of shelter, while the lands lie in the state of herbage, but for the convenience of separating and shifting flock. Hence it is incumbent on the planner of a farm to weigh well the various circumstances that belong to it, as on these only the true size and number of arable fields can be calculated. Even the shape of an arable field is not a thing of arbitrary choice. It ought to be regulated by the shape of the farm, and by the roads and water-courses running through it, as well as by the nature of its lands, the turn of its surface, and its aspect or expose. A perfect square, or long square, is a desirable shape, where circumstances will admit of it. Crooked lines and irregular figures are inconvenient in the operations of tillage, and should of course be avoided. Two sides at least ought to run parallel to each other. And it is equally, or more desirable, that each field should have a uniformity of soil and sub-soil, as on these depend the uses to which it is applicable; and it is at once unpleasant and unprofitable to have different parts of the same field under separate courses of management. Yet where the natural line of division is very irregular, it is improper to follow implicitly all its windings. The planner ought rather to draw a judicious line between the two, and the cultivator to alter the qualities of the lands, which happen to be unnaturaly severed, by draining, manuring, and other necessary means.

And the direction of the fields should be the same as that in which the land ought to be ploughed for a crop, provided it be compatible with the given lines of the farm. On a level surface, or on one which is gently inclining, the direction of the beds of retentive lands that require to be laid up in round ridges ought to be nearly north and south; in order that the crops on either side of them may receive equal sun, and ripen evenly. Consequently, in this case, the fences which form the two longer sides of the quadrangle should take that direction. But where the surface is steep, this principle of direction must give way to another of greater utility. If the land is retentive, and the soil requires to be laid up into round beds, across the slope, the direction of the ridges must be guided by the face of the slope; and the fences, on the general principle, ought to take the same direction; observing, in this case, where circumstances will admit, to let the fences wind to the right of a person standing on the brink of the slope, and facing towards it; as the beds ought to take that direction for the greater ease in ploughing them. And where the face of a hill is steep, and the land absorbent, the soil requires to be turned downwards of the slope of the well with turn-wort or Kentish plough; and the fences to be directed by the natural lines of the hill as much as possible.

In laying out cow grounds, grazing grounds, or other perennial paddure grounds, regard should be particularly had to water. And wherever good water is naturally found, or
can be conveniently brought by art, to that point; a pasture
ground ought to tend, in order to enjoy the necessary sup-
ply as much as possible.

And in laying out water-meadows, where they are situated
on sloping grounds, or the higher sides of which adjoin to
upper lands, the main conductor (where a proper fall from
the source of the water will admit of it) ought to define
the outline of the meadow on that side; and the fence which
separates the meadow lands from the dry grounds ought
to run immediately along the upper side of the water-course;
the two thus becoming natural guards to each other. But
within an extended flat, or an extent of gently inclining
meadow-grounds belonging to different proprietors, and
where deep ditches are required to be sunk on the upper
sides of the fences, to drain the lands that lie above
them, the plan here recommended would be improper.

But in the situations described above it is perfectly eligible,
and ought not, in ordinary cases, to be departed from. And
in concluding his observations on this interesting branch of
rural economy, the intelligent writer suggests, that in re-
gard to drift ways and private roads, where a public road
runs through a farm, the more distant fields ought, under
ordinary circumstances, to run into it, to prevent the in-
terior of the farm from being cut up unnecessarily by car-
riages, or poached by flocks, or laid waste by unnecessary pri-
ivate roads and drift ways, which increase the number of
fences, and are made and kept up at considerable expence.

And where public roads do not preexist themselves, private
lanes are highly requisite, especially within large farms.
It is obvious that all these circumstances require to be care-
fully considered by those employed in this sort of business.

And it is suggested by the writer, that whether in laying
out an estate or a farm, it is prudent to go repeatedly over
the ground, with a map of unalterable data in one hand, and
a list of desiderata in the other; and with the leading prin-
ciples of the art in the mind, but without any preconceived
general plan in view; ever letting the particular circumstances
of the lands to be laid out determine the true points to be
fixed, and the proper lines to be drawn; acquiring
the correct ideas of outline by enlarged surveys; and by more
minute examinations, adjusting particular points. In this
way farm lands may be laid out in the mostcaly and con-
venient methods for the purposes of their occupants.

For this reason, an arable farm, in the vicinity of a large
town, is worth a higher rent than one of an equal size and
quality in a remote part of the country. For the same
reason, namely, a superior advantage in regard to markets, a
sheep or store-farm in the north of England yields a higher
rent to the proprietor than one (but for the difference of
situation) of similar value in the north-west of Scot-
land. In renting a farm, one general rule ought, he thinks,
to be attended to, namely, fixing on good hands.

Over the kingdom at large, the rents paid for farms of this
description are in general reasonable, when compared with
what is commonly paid for those of more indifferent soils:

The author of the "New Farmer's Calendar," however, well
remarks, that it can obviously very seldom happen that a
tenant, in want of a farm, can have the opportunity of
choosing precisely that kind of soil and situation which
may be deemed the most advantageous; in general, he must
content himself with such as chance to be unoccupied; and
these chances, in fruitful parts of the country, have never
been of late years, and since the vast enhancement in price
of all the fruits of the earth, very numerous. But the
superior advantages of natural fertility and facility of cul-
tivation are too plain to admit of question or argument: and
nothing is more clear than the preference which ought to
be given to good land at the advanced price, since the culture
of barren land is infinitely more expensive, and the risk of crop
nearly double: and what is of great force, from the influence
of custom and local circumstances, the price of land in the
most fruitful counties is frequently as low as that of in
districts of far inferior fertility. An attentive observer,
although not very conversant in the principles or practice
of husbandry, can scarcely, he thinks, be deceived as to the
general nature and degree of goodness of soil upon a farm; a
comparison with the neighbouring farms, and their average
products, will be a sufficient guide. Wherever, says he, he
is found considerable depth of mixed soil, even if natural
fertility be deficient, art and culture will remedy the defect,
and fully reward the labours of the husbandman. On the
other hand, the most shallow and rocky lands, from a natural
richness in their light moulds, may be wonderfully produ-
ctive. The luxuriance and deep verdure of the grasses, the
spontaneous growth of white clover, the tall herbs and fruit-
fulness of the hedge-wood, particularly hazel, the large size
of the timber, and the height and sublimity of the trees, are
all common indications of a strong and fertile soil: plenty of
weeds, particularly thistles, although a popular, he fears,
is but an equivocal sign, since the most barren land will also
produce spontaneously abundant crops of those. He is
much more prudent for a farmer, he thinks, to wait and look
forward, than to engage himself upon a miserable barren
tract, where the certainty or promise can be of nothing but
overcalating labour and expence: such must be the case upon
soils which are naturally poor; at the same time of insuffi-
cient depth, and abounding with flat or shingles upon sandy
walks, parched gravels, cold, acid, iron clays, boggy or
poody lands, or to from which there is scarcely access or
passage during the winter months. Some such tracts we
have in England; and of those held in hand an opu-
ment and well-skilled proprietor can make a far greater
annual profit than can be drawn from the labour of a needy
and miserable tenant. The most profitable purposes to
which these estates can be devoted are, he conceives, the
growth of wood and of live-rock. A farmer who aims at
obtaining his profits with the least possible trouble and
risk, and without the burden of much live flock, must pro-
cure a rich light land-farm, with a sandy loam: on such a
situation, without a moderate capital, and the example of
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his neighbours before his eyes, he may, he thinks, set himself down in contented indolence, and yet grow rich. The case is widely different with him who engages with a strong eye, or, in the improvement of an exhausted or infertile soil; this will find an ample field for the most strenuous exertions, directed by a fair portion of agricultural skill, and ought to entertain no hope of very considerable success without the aid of a full flock of cattle. These observations are, he says, by no means intended to damp the ardour of aspiring husbandmen, who aim at raising a fortune and a name by the improvements of low priced land; for although, from the irregularity of rate per acre above hinted, the rent of land is seldom the prime cause of good or ill success, yet cheapness is a material consideration, when money is to be expended in gradual improvement. A farm at four or five shillings per acre, polishing within itself, or its vicinity, the permanent means of amelioration, will turn out a mine of wealth in the hands of an able cultivator, who, in the course of half his life, will bring it to a level of fertility with the high-priced kinds of land.

There is, the same writer remarks, another point which merits attention, which is, the manner in which the farm was formerly cultivated. If it has been exhausted and run out by over-cropping, and requires fencing, draining, repairs of houses, lime, manure, &c. all which are to be effected at the tenant's expense, the rent payable to the landlord in such a case ought, he justly obseus, to be very moderate, in comparison to what the tenant could, with equal propriety, afford to give, were he to enter on the lease when the farm was in a high state of cultivation and improvement. The difference here is, he says, much more considerable than the generality of proprietors or farmers are disposed to allow. For instance, a farmer who enters to the polish of a farm in a high state of cultivation, enters immediately to the greatest returns which that farm is capable of producing; while he who enters to a farm which had been previously exhausted by improper management, finds himself under the necessity of expending large sums on the improvement of it; when, at the same time, his returns for the first few years are probably inadequate to the expense incurred in carrying on even the ordinary operations. In the one case, the farmer enters, from the beginning of his lease, on the receipt of his annual profits, moderate as they may be; and in the other, he is looking a large share of his capital, for which his returns must at first be slow. If this be of capital and interest, the additional expense of cultivation, and the inferiority of crops for the first seven or eight years are fairly calculated, it will be, he thinks, be found that the farmer who, under these circumstances, pays twenty shillings the acre for a lease of nineteen years, has as high a rent upon the farm, during the whole lease, as the other who pays nearly double the sum.

One of particular great importance ought, he says, to be mentioned, namely, the propriety of renting a larger farm than the capital which the farmer possesses will properly flock and improve. When this happens, the tenant puts it out of his power to adopt the proper plans by which he could turn the farm to the greatest possible account. He becomes cramped in carrying on the ordinary course of business, and is frequently obliged to dispose of his crops at an under value for ready money; and therefore cannot purchase lime, manure, or other means of improvement, which are not to be had without the expenditure of considerable sums. Although it will not hold in every case, yet it may be ascertained as a good general rule that, in the improved parts of the kingdom, four pounds per statute acre is a moderate sum for flocking a farm, without including the expense of buildings, repairs, fences, drains, &c. If, therefore, a farmer should be so imprudent as to rent a farm of one hundred acres when his capital does not exceed 20L. he must be fortunate indeed in times and seasons if he has not occasion to repent of his temerity.

And by the same author it is observed, that it is doublends a sound general maxim for a man to hire no more land than his capital is amply sufficient to stock; the disadvantages and dangers of a want of money, in all concerns, are too common and well known to be for a moment inflected on; the farmer had indeed better be somewhat short than burdened with too large a tract of land; for in the latter case, if he be judicious and master of his profession, he may well employ his surplus capital in a superior and garden-style of cultivation, and as a dealer in live-stock. But it is yet a gratifying thing to an industrious man to refuse a promising bargain, particularly of the low-rated kind, on account of its extent, the very consideration which must animate his hopes; and when such a one has made the leap, instead of the common method of aiming at the culture of the whole in a slovenly, insufficient, and unprofitable manner, it would probably be much the fadest plan to crop only such a portion of the farm as his means would compass with good effect, seeking but to pay the rent and live, and, by dint of frugal and persevering industry, to make an annual addition, until, in the course of time, the whole farm should be in a flourishing state of cultivation.

The writer cannot forbear, he says, in this place, copying an important remark from Mr. Young, which, in truth, he has repeatedly been verified. Farmers frequently adopt no other rule respecting the rent they will give than mere custom, nor attend to any other criterion of estimating the worth and qualities of land, than that of the good or ill success of the last occupant; than which there can scarce be a more fallacious method of forming a judgment. He has known many farms, on which fortunes might have been obviously, and afterwards were really made, he unstarted, and taken afterwards with the utmost apprehension, purely because an ignorant, wretched, and needy tenant had failed therein. Many fine farms may now be pointed out, on which the old tenants fared, and brought their families to the workhouse, at seven shillings an acre; whilst their successors (times will the same, 6 or worse) made their fortunes by being rented at eighteen. It is a cruel discouragement to common discernment, to regulate his judgment and conduct from motives like these. If fair land be offered at a fair rent, it is well; if an additional rent be demanded, and a man, after the nicest scrutiny, both actual and probable, can discover money's worth in the terms, he must be wiser to forego the occasion. Some landlords, from a magnanimous and princely spirit, have faped it beneath their dignity to raise their rents; and certain tenants, mistaking the nature of this bounty and the question in general, are extremely averse to the very idea of any advance, not considering that it is a question of property, and that landlords, as well as tenants, have all possible right and reason to make a fair advantage of the growing prosperity of the times. Those men who are averse to a distant removal, by which they might obtain a far superior situation, from the single consideration of present lots in the disposal of their flock, do not, the author thinks, well understand their own interest. A present trifling loss, which the farmer's circumstances can well bear, ought not to weigh against a permanent and growing profit; this motive, however, compels many a farmer to a poor and barren spot: men are, T2 absolutely
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absolutely afraid of fair calculation, as they often are of their best friends.

In the examination of a bargain, he observes, the objections may be of a two-fold nature; such as may be held inapplicable; or such as may admit of compensation, either in proportional abatement of price, or in the goodliness of the prospect. As to the first, on perceiving them, a man instantly turns his back on the business. In his ideas, tithes taken in kind; a number of common carriage-ways, or paths, and the lands intersected by other property; far distant markets, and roads impassable in winter, are objections of that class; and granting pecuniary compensations can be made, there can be none found adequate to the anxiety of mind which must be inevitably suffered in such a situation.

Of these defects, with which a person is content to put up, he ought to have a very correct estimate, that he may really know when an offer is made deferring of his acceptance; an important point, where many contracting parties fail. Every practical man knows that in bargaining, as in angling, there is a critical moment, a time to strike, which may never return. The heads already enumerated will furnish matter for an estimate in writing, taken on the actual survey. Thence will appear the items necessary to be expended, and the deduction of rent, or other recompense, such expenditure will fairly warrant. In this estimate, the slate or nature of the fences should be well considered, and also the injuries done by game in some instances in particular situations.

It is on the whole concluded, that the farmer who intends to hire a farm, should consider whether the land be rich and fertile, and the climate favourable; as well as whether the farm be well situated in regard to markets; properly accommodated as to houses; has easy access to lime, marle, and other manures; and whether the price of provisions be fully on a par with the rate of labour.

Having adverted to these different circumstances, and fully pointed out the advantages of a perfect examination of the soils, so as to ascertain their natures and qualities, as to clays, marl, sand, loams, clayey loams, chalky clayey loams, and so on, the farmer is advised to try it by walking through the land. Let the farmer have a command of labour, manures, that work great improvements; nor large lands, which, under that false denomination, are often found the most profitable of all. It is supposed that the found, mellow, rich, plato, crumbly, sandy loams, are of all soils the most profitable; such as will admit tillage soon after rain, and do not bake on hot gleams of sun coming after heavy rains, when freely harrowed; such land is better worth forty shillings an acre, than many soils deferve five.

Next the heavy loam, which is near allied to brick earth; this, till drained, is in general an unkindly soil, without plenty of manure.

It is known in winter by being very adhesive upon walking over it; is long in drying, even where little or no water is seen upon it; for which reason it is generally late in the spring before it can be ploughed. When quite dry, it breaks up neither so hard and cloudily as mere clay, nor near to crumbly and mellow as good loam. If it be in flutles, it is apt to be covered with a minute green moh. There are many varieties of this soil, but all agree in most of these circumstances, and in being what the farmers call poor, cold, hungry land. When hollow-ditched, and greatly manured, it yields any thing; but those who hire it should forget neither of these expenses.

The gravelly loams are numerous in their kinds, and very difficult in their natures. Warm, dry, found gravelly loams, are easily distinguished in winter. They admit ploughing all winter through, except in very wet times; always break up in a crumby flate of running moulds; and if in a hubble, will dig, on trial by the spade, in the same manner. If under turns, it may be perceived by walking through them, that it will bear their being ploughed off. But the wet cold spungy gravel is a very bad foil; it is known in winter by the wetness of it; and in spring, by its binding with ready showers. It rarely breaks up in a crumby flate, or shows a mallowsend under the spade. Very expensive drains greatly correct its ill qualities; but it requires a prodigious quantity of manure to fertilize it. And other graved are to sharp and burning, that they produce nothing except in wet summers; but such are known at any season of the year.

And the sand-foils are as various as the gravels, and are all easily discoverable in their natures. The rich red sand is, it is believed, as profitable a soil as any in the world. It lies, at all foils a dry founds, and at the same time a moister without wettis, which severs crops even in dry summers. The spade is sufficient to try it at any season of the year. The light sandy loam is likewise an admirable foil; it will bear ploughing like the preceding, all winter long, and appears quite found and mellow when tried with the spade. If it lie under a winter fallow, the best way of judging of its natures is to remark the flate of the furrows, and the degree of adhesion in the foil. Stiff land, being dry and crumby, is a great perfection; and sand, being adhesive, is an equally good sign. Consequently when the farmer views a light sandy loam, whose found dryness is acknowledged, he may presume the foil is rich, in proportion to its adhesion. Where it lies fiat in powder, and has no adhesion, it is a mere sand. The white chalky marm is often cold and wet, will not bear ploughing in winter, unless the weather be very dry or frosty; runs excessively to mortar, with a heavy yellow when in a pulverized flate. It is a cold foil of little profit, is supposled, except with peculiar management. It is believed to answer well when laid down in a dry flate to fallow. The farmer is advised to try it down as a maxim, that strong, hard, tenacious clay, though it will yield great crops of wheat, is yet managed at so heavy an expense, that it is usually let for more than it is worth. Much money is not often made on such land. The very contrary foil, a light, poor, dry sand, is very often indeed in the occupation of men who have made fortunes. Some permanent manure is usually below the surface, which answers well to carry on; and sheep, the common flock of such foils, is the most profitable sort he can depend on.

All the light foils of foils are viewed to most advantage in winter; the general fault of them is wetness, which is in the greatest excess at that season of the year. If the fields be level, and the water stands in the land, notwithstanding the furrows are well ploughed and open, it is a sign that the clay is very fluff, and of so adhesive a nature, as to contain the water like a dish. It is likewise probable, that draining may prove insufficient to cure the natural evil of such land. This kind of foil likewise shews itself in the breaking up of flutbles for a fallow; a very strong draught of cattle is then necessary to work it. It breaks up in vast pieces, almost like as iron. When it is worked fine, it will run like mortar, with a heavy spring or firmer flower.
F A R M.

flower. These soils will yield very great crops of beans and wheat, &c. They must, like others, be cultivated by somebody; but it is advised to have nothing to do with them, where it can be avoided, nor ever to be cultivated with feeding large crops upon the land, for the farmer does not see at the same time the expenses at which they are raised. Peat, bog, moor, and fen, in many variations, are very profitable; but the expenses of improvement demand a calculating head. The vicinity of lime or marl is here of great importance.

In gravel lands the marks for judgment are different. They are, in the writer’s opinion, best examined by attending, first, to the circumstances in which they are most deficient; and then to such as are in their favour. The more seafons grass-fields are viewed in the better, though any one is sufficient for a tolerable judgment. One great evil attending these lands is, that of being too wet; the signs of which can never be mistaken or overlooked in any season of the year. In winter it is at once perceived by walking on them; at all times of the year by the herbs which generally abound on them, such as rushes, flags, and a great quantity of moss; and also by the colour of the grass, which is mottly blue at the points; sometimes of a dirty yellow hue, and always coarse. If the soil be the first described, stiff clay, and the surface level, the evil will be very difficult of cure; if of the other, stiff soil, or stiff loams, draining will have great effects in improving it.

Grass fields on gravelly soils are, if the gravel be sharp, very apt to burn in dry summers; but they give great and sweet crops in wet ones, provided that the land be a gravelly loam. An absolute gravel should never be under grasses. A farmer should not, however, regret having a pasturage or two of this kind in his farm, as they are of excellent use in winter for feeding sheep and lambs on with turnips or other food of the same kind.

With regard to the low meadow lands, whatever the soil may be on the banks of the rivers and brooks, they are in general good, but often subject to the misfortune of being overflowed in summer, which not only ruins crops of hay before they are cut, but carries them away, perhaps when just made. And many grass-fields on all soils confind of good herbage, as to be of little value. Made up of weeds, and the worst and coarsest of grasses, if a landlord will not allow such to be ploughed, the farmer should minute down the rent accordingly. This fault is visible at all seasons, and cannot be easily mistaken. But a river that does not overflow, running through a farm, is a very favourable circumstance, as it indicates a probability of all the grass-fields being well supplied with water for cattle, and other animals.

Besides the circumstance of well proportioning the size of the farm to the extent of capital as already noticed, there are several others which should be well considered in fixing upon farms, such as their being compact and convenient in the fields, which are too often overlooked by farmers who are about to rent land. If they attended to it as much as their profit required, we should, the writer thinks, see landlords reforming their estates, in this particular, more than many do at present. There is not, it is supposed, a more expensive, perplexing circumstance in a farm, than that of the fields being in a disarranged, disconnected situation. The disadvantages are obviously numerous and striking.

The covenants of leases should likewise be well attended to, as landlords are very often tenancies of those which they have usually inherited in them; so that a farmer, when he acquires of a farm, and agrees to the rent, may not find the conditions of tenure proposed to him, such as are compatible with his interest, his genius, and with good husbandry. The merit or reaons of covenants must always be considered in connexion with the nature of the farm. It is for want of this consideration that unreasonable covenants are ever proposed. And these prohibitions are often foolish, but sometimes admissible; they would depend on local circumstances, which should be well weighed by the farmer before he makes his decision.

The ascertainment of rent is a highly important part of the business of hiring a farm, though the circumstances already noticed precede it, as the rent must in a great measure depend on them. The chief point necessary to be here considered is the combination of rent, tithe, and rates in one sum. It is advised that the farmer, knowing the capital intended to be invested, should estimate the interest of it at not less than 10 per cent, and then calculate the expenses and produce; the former, being deducted from the latter, will leave that sum which he can afford to pay in three or four years of rent. And further, deducting the tithes and rates, the remainder will be what he can afford to pay to the landlord. Where rent is calculated in any other way, it must be erroneous and deceitful, and not by any means to be depended on.

On the business of flocking farms, the same able writer has likewise suggested many useful hints and directions. He considers the advantage to be derived from the occupation of land to depend so much on the farmer commanding the requisite capital, that it is extremely necessary for the young beginner to be well advised on so essential a point. If he be fixed in business by some experienced relation, he will not, of course, want the proper instruction; but as many adventurers, as they may be called, are every day making efforts to try their fortune in the culture of the earth, and many gentlemen taking farms into their hands, sometimes without sufficient consideration of the necessary expenses, it may not be improper to consider a few points concerning this business. Thirty years ago, the sum which was usually appropriated to the flocking of a farm, varied from three to five pounds the acre; and it was a general idea, that the fitter improved flocks, the more profitable was the farm, and part grasses, of no uncommon fertility, rich manures were, of course, excluded in the calculation, and light rock farms were often stocked for three pounds the acre. But these matters are now greatly changed: rents are much increased; tithes are compounded at a higher rate of payment; poor rates are enormously risen; all sorts of improvements comprehended in the article wear and tear are thirty or forty per cent. dearer; labour is in many districts doubled; the prices of cattle and sheep, as well as all other sorts of live stock, are greatly advanced; so that at present, the same farm which at that period would have been very well stocked, and the first year’s expenses provided for, at the rate of five pounds the acre, would now demand nearly from seven to eight pounds the acre. But it is to be remembered, that in all farm estmates it is necessary to suppose that every tool bought in is new, and that the live flock be good at the start, as well as that the first year’s expenses be provided for, though a portion of the crop may come in before the whole payment is made. It is stated that a man cannot be at his ease if he do not provide in this manner; nor will he be able to make that profit by his business with a small capital, which will attend the employment of a larger. By profit the writer would be understood to mean a percentage on his capital, which is the only satisfactory way of estimating it. If, by flocking a farm with five pounds the
acre, he makes seven or eight per cent. profit; and by
flocking in the proportion of eight pounds the acre, he
makes ten per cent. (and this difference will, it is believed,
often be found); it must be sufficiently apparent that the loss
by the smaller flock is a very serious evil. It will depend
much, it is supposed, on situation and local circumstances:
the benefit of procuring manures, or litter, to make dung,
may, in some places, be very great, in others much less; but
not to be able to profit by every favourable opportunity
that may attend the spot on which a farmer is fixed, must
be highly disadvantageous to him. To irrigate land is an
expensive operation; but to omit or pollute it for want of
money for the undertaking, is to lose, perhaps, the capital
advantage of a farm. Cales of this sort might be greatly
multiplied; and there is not one that does not call on the
farmer for an ample capital to obtain the greatest possible
benefit.

It is hinted, that of all the different sorts of farms thole
of the Warren kind are hired or fenced with the smallest
capitals; but there are many lands in different districts,
and especially in Lincolnshire, which are fenced at the vast
rate of more than thirty pounds the acre. And the gen-
eral annual expense of many hopt plantations rises to thirty
pounds, and the capital to more than fifty pounds the acre.

In general, for flocking, according to the modern prin-
ciples of husbandry, not less than from eight to ten, or fif-
ten, pounds the acre may be necessary; and in some cases,
where improvements are to be made, considerable more will
be required.

It is suggested, that if the farmer is not capable of
making ten per cent. on his capital, he must either have an
indifferent farm, there must be bad management, or the
times must be greatly against him. It is justly supposed
that he should make from twelve to fifteen per cent., and
that some farmers make more, even when the price of corn
is not in any way extravagant.

Those directions should be well weighed and considered
by those farmers who have had but little experience, be-
fore they enter upon the serious business of hiring and
flocking farms.

It has been remarked, in respect to the advantages of
different sorts of farms, by the author of the "New Far-
mer's Calendar," that were it demanded of him generally,
what is the most advantageous application of land? he
should be inclined to answer, that of dairying, or feeding
a large number of cows for the produce of butter; but with
the reserve, that the business be conducted with great var-
ation from the common modes. The dairy-man must
himself be a perfect judge of the live flock which he enter-
tains, and they be of the improved species: no bad milkers
must be kept, nor indeed any kept too long; the profit of
grazing must come into the account, and of pig-feeding to
a much larger than the usual extent. The winter provisions
for the cows, both green and dry, must be so ample as to
equalize the produce of butter; in money, at least, with that
of the summer, and it will be clearly advisable to have a
considerable breadth of land under the plough. If this,
however, be the most profitable, it is, no doubt, he says,
the most troublesome scheme of husbandry. The next in
point of profit is, he thinks, two-thirds arable, and one-
third grass; the most advantageous winter feed provided,
and cattle enough of the best kinds kept to furnish annually
from twelve to fifteen loads per acre of rich compost. This
may prove more profitable than if all the land were grazed,
since it is to divide the risk of markets between corn and
cattle; and large crops of the former may of right be ex-
pected where the quantity of manure shall have been so libe-
ral. A family which cultivates a parcel of land, with the
prudent view of increasing its income and domestic comforts,
should keep, he says, a small dairy, with two or three breed-
fows, a small flock of sheep, some tame rabbits, and a
few hives of bees. It should not be forgotten to rock a
fish-pond or two, if there be such convenience. The plan
will also, he thinks, admit of the fattening a few bullocks
annually.

Hay-farms and grazing-farms are obviously, he says, at-
tended with the least trouble. Hay-farming is, however,
by no means the most profitable branch of husbandry, as it
lies under the constant disadvantage of incapacity to feed
live stock to any good purpose; hence much after-grafts
are annually wasted. Granting a hay farmer has fattened
a lot of hogs, they must, he observes, be late in the season,
when beef is usually cheap, and he cannot keep them until
after Christmas, for fear of injuring his future crop of hay,
which is his grand dependence. As to grazing, however
profitable or void of trouble it may be, he would advise
every person to be cautious how he enters into it to any
extent, unless he has previously acquired a consider-
able knowledge of live stock. Most bailiffs know much
worse than nothing at all of the matter. In the common
advice given on the head of breeding animals, aptitude
of situation and room have always been very properly in-
flected; but the consideration, the most important, perhaps, of
all others, hath hitherto been neglected, viz., the time of
the breeding himself for the undertaking, without which,
we will venture to affirm, no adequate success ought to be
expected. A man ought to be possessed of much sensibility
for the brute creation, with a considerable spice of the
mania of improvement, who sets up for a breeder. In his
daily or weekly bible-excurions, he must be sure never
to forget the book of Job. He must enter fully into the spirit
of a thousand little niceties, both of judgment and practice,
which it would take a good volume to describe. He must
find a pleasure in well-feeding care and solicitude, and keep
a perpetual watch. On such conditions a breeder, he thinks,
will acquire wealth and fame. The generality of cultivat-
ors, whatever may be their situation, had, perhaps, better
purchase their live stock ready made. With regard to fat-
tening animals for market, the greatest difficulty, in his
opinion, occurs with pigs, as is sufficiently manifested from
the accounts of our numerous experiments. "The English
of the matter is, he thinks, that the business requires a cor-
rect judgment both of that species of stock and of the
markets.

But whatever be the nature of the farm, it is obvious
that it can never be cultivated to the greatest possible advan-
tage without having the security of a fair equitable lease.

See Lease.

And on the conducting or management of farms, it is
observed by the same author, that it has always been the
fashion to lay much stress on the difference between the gen-
tleman and the labouring farmer, and to allow a decided su-
priority to the latter, nay, even to deny all possibility of the
former deriving profit from the practice of husbandry.
The matter has, he thinks, been improperly stated. No-
thing can be more true than that the man, whether gen-
tleman or farmer, who determines to remain ignorant of his
business, and who indolently suffers himself to be cheated
through the nose, will have a fair chance to be ever-
lastingly unsuccessful. But grant the gentleman a moder-
ate portion of the science of agriculture, and a decent com-
petency of activity and resolution, and he conceives the
balance will preponderate even heavily on his side, whatever
may
may be the quantity of lands, from a cabbage-garden to a farm of a thousand acres. The personal labour and superintendence of the mere common farmer, in the old besten track, can never, he thinks, stand in competition with the advantages of the new husbandry, of the most productive kinds of live flock, of an ample portion of manure, and of the garden elements of the huf-culture. Agriculture, viewed in a trading light, perhaps makes a return for the use of money as any domestic concern whatever; and although such be not the general custom, it is easy enough of proof, that very great capitals, to the amount of twenty, thirty, or forty thousand pounds, and upwards, might be safely and prosperously employed upon an extensive farm. The cultivator of two thousand acres, who should fully flock according to the principles of the new husbandry, breed and fatten his own cattle, consuming all his spring-corn at home, bacon his hogs, and meal his own wheat; would find occasion, he says, for farms of very high account.

His articles being all those of the first necessity, and being without the obligation of allowing credit, the profits would be more certain, and the risk less, than in any mercantile concern. In what, he adds, confines the new husbandry, so often quoted by agricultural writers without a definition? In alloting certain portions of an arable farm to the purpose of summer and winter feeding a flock of cattle, sufficient, with their dung, to manure and fertilize the whole of the land; in erecting, as far as possible, all fuel-leafs, and other temporary constructions, and in the judicious selection of domestic animals. The usage of the old husbandry (too generally prevalent indeed, he says, at this hour) is to place very little dependence on the profit of live flock, to feed very few, excepting those animals absolutely necessary for labour, to reject the hoe-culture, perhaps altogether, to foul the land by repeated corn-crops, and to clean it partially and insuficiently by summer-follows, or feed in its full state for a temporary ley.

There is, says the writer, a fallacy amongst farmers of inferior property, which demands examination, if not correction. A man will make any shift, even to the neglect of the important advantage of purchasing cattle in the autumn, rather than feed his oats during harvest, or his wheat at Michaelmas. His importance is much diminished, unless he can make a capital display of stacks; but fair and impartial calculation must be his guide in this cafe, who pursues his real interest.

Farm Buildings, in Rural Economy, are such buildings and offices as are necessary for carrying on with convenience the various concerns and purposes of a farm. It is evident that the nature and extent of such erections, as well as their peculiarity of construction, must be very different, according to the difference of farm management which is required to be carried on with them. However, in general, a much greater extent of such buildings will be necessary where the farms are of the arable or corn kind, than where they are chiefly dairy, grazing, and hay or grass kind. Though the extent of buildings, even for those of the first of these forts, may be greatly retrenched by having recourse to the threshing-machine, and the beneficial practice of flacking the grain in proper yards, with suitable fladderes for the purpose, and at the same time the expense of such erections be considerably reduced by having simply shed-buildings instead of those of a more finislied kind, which are most in use, while the convenience to the farmer will be nearly the same. There is, however, one circumstance to be here particularly regarded, which is, that whatever the description of the farm may be, the extent of the buildings should conftantly be ample sufficient for the various utes of it.

The most usual descriptions of buildings which are wanted on farms, are those of farm-houses, barns, stables, granaries, cow-houses, cattle-feeding, calf-woods, dairy-houses, baly-rooms, root-houses, straw-rooms, chaff-houses and bins, cart-ridges, barns-houses, tool-houses, work-shops, poultry-houses, idea-deck, and hay-flahces. See their several heads.

There has been considerable diversity of opinion among writers on rural economy concerning the most proper distribution of buildings of this sort, and the point is yet far from being decided. It is, however, obvious that it must be different in some degree, according to the peculiar nature of the farm, and the way in which the business of it is to be managed.

In arable farms, or those which are chiefly under the plough, the principal things wanted, in regard to distribution, are that the farm-yard and buildings should have a central situation, in respect to the ground, being a little elevated if possible, and near the principal market-road. If contiguous to a brook or small river, it may be an advantage in the supplying of water, as well as turning different forts of machinery.

On pufhure farms, especially those of the sheep kind, but very few buildings are requisite, where they are of the dairying, grazing, or breeding forts, is there any necessity for their being numerous. In their distribution the convenience of roads and water should be particularly attended to.

In mixed farms, or those which are partly of the arable and partly of the grazings, the distribution of the buildings should be pretty much the same as on those of the perfectly arable fort, only perhaps somewhat fewer in number.

On family, or residence farms, which are another kind of mixed farms, calculated for the convenience of personal residence, uniting the pulture for breeding, rearing, and occasionally fattening animals, as well as the keeping of milch cows, and growing meadow-hay, with the arable land for the supplying of artificial fodder, grain, roots, different kinds of vegetables, green-food for foiling, and so on.

The variety of buildings should here be considerable, so as to suit the different purposes of the farm, having the principal of them, or what may be called the farmery, conveniently contiguous to the family offices, but at the same time effectually screened from the residence, being likewise well connected with all the different parts of the farm, and, if possible, placed so as to have the advantages of wind and water. This fort of farm has been well described by Mr. Loudon in his "Treatise on Country Residences."

The subject of the proper distribution of farm-buildings is fully entered into in an able paper in the first volume of Agricultural Communications to the Board. The writer there considers the construction, arrangement, and situation of these buildings as so important to the practical farmer, as to merit the fullest attention of the rural economist. It is stated, that on a judicious combination of these points the convenience and facility of carrying on his different operations in a great measure depend. Yet the examples of farm-offices being erected either on a commodious plan or with any thing of judgment in the situation, are extremely rare. Indeed, says the writer, whether we view this subject as relating to the landlord, the tenant, or the public at large, it appears highly interesting. To the landlord it is a matter of considerable moment, a part of his rents very often depending upon it; for it is natural to suppose that a tenant, especially on a long lease, would give more for a farm if the buildings are
house and offices were commodious, than if they are so miserably-deficient as most farm-offices are. He would even be the more readily induced to take a farm on that very account; and thus the landlord may often lose a good tenant, merely by not having proper accommodation for him. He has heard farmers declare, that they would willingly agree to pay five per cent. or more on the expenses laid out on commodious buildings, over and above the rent of the farm, rather than occupy for nothing those at present poofies, and that they would, beside, undertake to be at the expense of every ordinary repair during the continuance of their lease. How then, say he, can a landlord lay out a few hundred pounds to better purpose than to accommodate his tenant, if he gets not only five per cent. on the money thus laid out, (but provided his buildings are very complete) perhaps as much additional rent as will amount to five per cent. more. He is well convinced that the great expense of erecting new farm buildings in the usual way is a very material obstacle to altering the present form; for there are few landlords, he supposes, who would choose to lay out five or six times the rent of a farm in new accommodations for that farm, if by propping and patching they can at a small expense make the old buildings answer. When, says he, we hear of 500l. being expended in building a barn on a small farm of about 100l. rent, as is the case in some parts of England, and 1000l. laid out on a farm-house, it is no wonder that landlords are cautious of engaging in such buildings, and it cannot be supposed that tenants would be mad enough to do so. Hence, perhaps, is the principal reason why the generality of farm-houses and offices are in so ruinous a condition. But when farmers can be persuaded that such enormous barns are unnecessary; that their corn can be kept much more secure and less liable to injury in a well-laid rich yard, and that they have just room enough in their buildings for all the common purposes of the farm, no more is requisite; also, that a neat, small commodious dwelling-house is fully more comfortable than a large dilapidated one; then we shall find, he thinks, that landlords will more readily agree to accommodate their tenants; and that instead of those gloomy, preposterous, ruinous buildings, now a disgrace to almost every part of the kingdom, we shall behold neatness and uniformity combined with every necessary accommodation, which will afford not only pleasure and comfort to the occupiers, but a beauty and an ornament to the country at large. That this may be accomplished at a very moderate expense, he hopes to be able to prove. So far as any general rule can be given upon this subject, and allowing for circumstances and the variation of prices, he is fully persuaded by the observations he has made in different parts of the kingdom, that, in general, one year's rent of the farm, if not under 70l. (or at most 80l.) is amply sufficient for building every accommodation necessary upon that farm, exclusive of the dwelling-house; and that one year's rent is enough to build a dwelling-house on all farms not exceeding 400l. a year (in many situations less may do); and, lastly, that 50l. are sufficient for a dwelling-house, and 1000l. for offices on a farm of any extent. It is likewise observed, that in building new farm-houses and offices, a great saving of expense will accrue, by making use of all the serviceable materials in the old buildings, where such buildings are, and it will afford many (provided they are fairly dealt with) who have been accustomed to those large, unnecessary, and expensive buildings commonly used, at how small an expense, comparatively speaking, a new set of offices, or house may be built, having the advantages of such materials near the spot. Workmen, in general, are much averse to using old materials, especially carpenters, who, rather than run the risk of touching a ruffly-nail with a hatchet or saw, will put their employer to the expense of some hundreds of such tools, by condemning the old, and advising him to procure new timber.

To a tenant, the construction and arrangement of his farm-buildings is a matter, he says, perhaps of more importance than even to a landlord. After all his toils and labours, and the many anxious and sleepless hours he has passed before his crop has come to maturity, if his offices are insufficient, or improperly constructed, he will run the risk of many inconveniences, and even real loss. The fecundity of his grain, the labor of his horses, and other cattle, the duration of his implements, are all dependent on the perfection or imperfection of his offices. By arranging them judiciously (a matter very little attended to), a great deal more labour may be obtained from his servants, and every operation on the farm will be carried on with more facility and dispatch; for, if a barn is set down here, a stable there, a cow-houfe or feeding-houfe in another place, all without rule or order, and as if chance had set them down, much unnecessary labour will be occasioned, and a great deal of time lost in carrying provender to the cattle, and in keeping them so clean and dry as is necessary towards their health and preservation.

Farm-buildings, as has been already remarked, should always, he says, be proportioned and constructed according to the size and produce of the farm; which, in setting their dimensions and arrangement must be particularly taken into consideration. If, for example, the farm is adapted entirely to grazing, very few buildings will be necessary, except some sheds, and these will be in use chiefly during the winter months, temporary ones being often erected in the fields for the summer. On farms where cattle are housed all winter, or in such farms where more buildings are used in winter than in summer, a great expense in roofing may be saved in cattle-sheds by erecting walls only, or having pillars or posts placed and framed in such a manner as to support peas, hay-ricks, or any other fort of ricks that are not intended to be taken down till the spring or summer. This will not only answer the purpose of an excellent warm roof, but will be a very good situation for building such ricks. If, however, the farm is entirely for grazing, as before supposed, there may not be a sufficiency of ricks, unless of the fodder for the cattle, to make such temporary roofs. In that case the sheds most of course have permanent ones, which may be of the cheapest construction. Or, if there should be a sufficient number of boards about the farm, as is sometimes the case, they may be laid loosely on, to serve as a roof to the sheds, till wanted for other purposes.

But a dairy farm will require a different fort of accommodation, being in general composed partly of the grazing and partly of the arable kind. The cow-houses must be proportioned to the number of cows usually kept, with every other accommodation for carrying on the dairy business, whether as a cheese or butter farm. Small stables, and a small barn, are sufficient for such a farm.

But in an arable or corn farm, which generally partakes of both the other forts, the buildings must be more numerous, and suited, in some respect, to all these different purposes; the stables in proportion to the number of horses or cattle requisite for labouring the farm; the cow-houses, and feeding houses, according to the number of cows generally kept, and cattle fed; the barn and granary according to the extent of arable land, together with all the other usual accommodations for breeding young horses or cattle, for hogs, poultry, &c. all which must be particularly considered, while planning the farm offices and buildings.

However,
farm-buildings, the first thing to be taken into consideration, after choosing the situation, is the nature and produce of the farm. From these may be judged the different kinds of accommodation that will be necessary. For example, every farm must have, first, a dwelling-house; 2dly, a barn suitable to the extent of arable land on the farm, either with or without a threshing-mill, but always with one, if possible; and it should be endeavoured to place it so that it may go by water, if a supply can be had; 3dly, stables, the dimensions of which must be determined according to the number of horses necessary for the farm; 4thly, cow-houses, or feeding-houses, or both, according to the number of cows and cattle; and so on, till the whole accommodations necessary, and their dimensions, are fixed upon.

Having ascertained these, and the situation for building on being also settled, the ground must be carefully and attentively viewed; and if not very even, the different levels must be observed, and the best way of conducting all the necessary drains, and carrying off all superfluous moisture. Also the best situation for dung- and urine-pits, or refurinage, which will, in a great degree, ascertain at once, where the cow-houses and stables should be. These being fixed on, the barn should, he observes, be as near them as possible, for the convenience of carrying straw to the cattle; and the barn-yard should be contiguous to the barn. If a granary is resolved on, that should also be near the barn, or over it; as likewise the flail-house, which should be close to the barn. These main points being determined, the others will easily be found; always observing this rule, to consider what is the nature of the work to be done about each office, and then the easiest and least laborious way to perform that work as far as it is connected with other offices. In case this should not be sufficiently explicit, he shall suppose, by way of illustration, the situation of a feeding-house is to be considered of. The nature of the work to be performed here is, bringing food and litter to the cattle, and taking away their dung. The place from whence the greatest part, perhaps, of their food and all their litter comes is the barn; therefore the feeding-house should be as near the barn as possible. If turnips, or other roots, or cabbages, make a part of their food, the most commodious way of giving these must be determined on; whether by having a root-house adjoining the cattle-houset, and that fixed occasionally, or by having a place to lay them down in near the heads of the flail from whence they are thrown in at holes in the wall left for that purpose. The easiest method of clearing away the dung must also be considered, according to the different plans mentioned when describing cow-houses, cattle-fields, &c. See Cow-house; and Cattle-field.

And the same general rule being observed in determining on the site of all the other offices or accommodations, together with a careful examination of the ground to be occupied (upon which the arrangement of the offices in a great measure should depend), any person conversant in rural affairs, who attends to their particulars, and can lay down his ideas in a drawing, may, he thinks, easily direct the planning and building of a very commodious set of offices. With respect to the site of the dwelling-house, in addition to what has already been said, it may be remarked, that, although a house, being situated in the middle of a regular front, is, in some points of view, the most pleasing way, and in many situations perhaps the best, yet, unless the ground and other circumstances in every respect favour such a disposition, he would not invariably adhere to it; for, if it may often happen, he thinks, that a much better situation for the dwelling-house may be obtained at a little distance.
From the offices, and a pleasing uniformity enough be observed in them at the same time.

In some cases, and for some kinds of farms, it may be particularly necessary to have the house so placed in respect to the offices and farm-yard as to admit of their being constantly inspected, and the labour which is to be performed in them to be perfectly attended to and superintended.

A late writer on "Landed Property" has, however, well remarked, that the particular requisites of a farm-stead are as various as the intentions of farms. A sheep-farm; a grazing-farm; a hay-farm; a dairy-farm, and a farm under mixed cultivation, may require different situations and different arrangements of yards and buildings. On a farm of the kind, which may be considered as the ordinary farm of this kingdom, the principal requisites are conceived to be shelter, water, an area or site sufficiently flat for yards and buildings, with meadow land below it, to receive the washings of the yards, as well as found pasture grounds above it for a grazed yard and paddocks; with private roads, nearly on a level, to the principal arable lands; and with suitable out-lets to the nearest markets. Where the soil is wanting in the desired situation, it may in time be furnished by plantations and mounds. And where there is not a natural supply of water, a well, water-tower, or artificial mill may furnish it. And grazed lands are easily produced in almost any situation; and by the help of enriching water, or by manure and pasture may in most be rendered perennial.

From what has been advanced it is conceived evident that no general plan can prevail, even on what may be emphatically called an English farm, composed of arable meadow, pasture, and wood lands. The plan of the farm-stead must ever be moulded to the main object of the farm, whether it be corn, the dairy, rearing cattle, fattening cattle, or sheep; as well as to its size; for although the farm or nearly the same species of conveniences are required on a small as on a large farm of the same intention, the number may be less; and the arrangement be made on a more frugal plan.

But in this, as in every other matter of arrangement, the first thing to be done is to ascertain the particulars to be arranged, which for a farm of the mixed kind or under mixed husbandry may be thus enumerated: 1st, a set of farm buildings adapted to the intended plan of management, as a dwelling-house, barns, stables, cattle-hed, cart shed, &c; 2dly, a spacious yard, common to the buildings, and containing a receptacle for stall muck, whether arising from stables, cattle-hed, or offices, together with separate folds or yard yards, furnished with appropriate sheds for particular stock, in places where such are required; 3dly, a revoir or catch-pool, situated on the lower side of the buildings and yards, to receive their washings, and collect them in a body, for the purpose of irrigating the lands below them; 4thly, a corn yard, convenient to the barns; and a hay yard, contiguous to the cow or fattening sheds; 5thly, a garden, and fruit ground near the house; 6thly, a spacious graze yard or green embracing the whole, or the principal part of the conveniences; as an occasional receptacle of rock of every kind; as a common pasture for swine, and a range for poultry; as a security to the fields from rock, in draining out of the inner yards, and as an anti-field, or lobby, out of which the horse-grounds and drift-ways may be conveniently entered, for different purposes.

With regard to the distribution and arrangement of these objects, in order to make it with good effect, great caution, study, and patience are required; that the most may be made of given circumstances. An accurate delineation of the

FARM.

site which is fixed on requires to be drawn out on a scale; the planer studying the subject alternately upon the paper and on the ground to be laid out; continuing to sketch and correct his plan, until he has not a doubt left upon his mind; and then to mark out the whole upon the ground, in a conspicuous and permanent manner; before the foundation of any particular building be attempted to be laid. It may be easily conceived by a person who has not turned his attention to this subject, that there must be some simple, obvious, and fixed plan to proceed upon. But seeing the endless variety in the mere dwelling places of men, it is not to be wondered at, if a full greater variety of plans should take place where so many appurtenances are required; and these on sites so infinitely various; nor that men's opinions and practices should differ so much on the subject, that on a given site no two practical men, it is more than probable, would make the same arrangement. There are, however, certain principles which no artist ought to lose sight of in laying out buildings and conveniences of this description. The barns, the stables, and the granary, should be under the eye, should be readily seen from the dwelling house. And the prevailing idea at present is, that the several buildings should form a regular figure, and include an area or farm-yard; either as a fold for loose cattle, or where the grazing of animals is practised, as a receptacle for dung; and the most prevalent figure is the square. But this form Mr. Marshall supposes more defective than the oval or circle, the angles being too sharp, and the corners too deep. Besides, the road-way, necessary to be carried round a farm-yard, in order to have a free and easy passage between the different buildings, is inconveniently lengthened, or made at greater expense. The view of the whole yard and buildings, from the house on one side of it, is likewise more confined in some respects.

The able author of the work on "Landed Property" had, formerly, he remarks, suggested the plan of a polygon, or many-sided figure, or an irregular semi-octagon, with the dwelling house and the stables on the largest side, having ranges of cattle-halls opposite. But he has since formed one on the complete octagon, the dwelling-house being on one side, and the entrance, gateway, and granary opposite, the remaining six sides being occupied by stables and cattle-hed, with a broad-way dipping gently from the buildings, and surrounding a wide, shallow dung-ditch, which take up the rest of the area of the yard. This is offered as a hint to those engaged in laying out and directing buildings of this fort, which they may adapt to the particular nature of the site or situation of such as they are about to erect. But it is suppoised not essentially necessary to follow any particular form or figure. The sides may have a greater or shorter length, according to the nature of the site, and the intention of the builder. The site should, if possible, be nearly, but not quite level; the principal yard being formed across the defect; having the barn on the higher, and the stables on the lower sides; as in this way the barn, rack-yard, yard-yards, cow-halls, and dwelling-house will have a dry situation; while the road that leads into the yard, and to the carriage-hed, will be on the level ground, which is the most suitable and proper.

In regard to the dwelling-house, the situation which is the most advantageous must in some measure be directed by the extent or size of the farm. Where it is small, for the purpose of the labouring farmer, it may be placed at the north end of the yard, facing into it, and be approached through it. As the kitchen is the chief room in which he resides when at home, and in which his wife performs most of her domestic business, the yard, the buildings, and the rock in
in the yard, will be constantly under the eye. But in an extensive farm, where a yard-man is kept to attend the stock in winter, and where the house-work is mostly done in the back-kitchen and dairy-room in the summer, and when the farmer is devoid of entertaining his friends with a more agreeable prospect than a farm-yard, the house may occupy the south end of it, facing into the garden, and have a separate approach in front. It is, however, suggested, that the frill mode of distribution gives a desirable shelter to the yard, while the latter leaves it exposed to the north winds, which blow through the entrance and open carriage-flelds. In either case, it is favored from the cold winds by the barn and cattle-flelds. It is also of advantage to have the house fronting to the south, in order to give coolness to the dairy buildings. But since the introduction of threshing machines, in the place of threshing floors, the barn is become quite different, requiring another form, arrangement, and situation. One end of it should, in the ces, be placed towards the farm-yard, instead of the side, which is proper in the contrary circumstances, the other end being towards the stack-yard, to which it should be connected, with a sail-way for removing the corn upon to it, having a lean-to shed and draw-yard on the sides where they may be requisite. These barns should be large enough to contain a good quantity of grain at a time, for threshing out in wet weather, when little elfe can be done. See BARN, FARM YARD, and THRESHING MACHINE.

It is further suggested, that the small angular room-blocks between the ranges of sheds may be formed into convenient places for containing fodder, roots, &c. and for the keeping of calves, &c. &c. There should likewise be a receptacle for the flail manure, which should be properly formed and connected with the flails by proper drains, and a reservoir for the reception of the yard liquor, where it cannot be turned upon the land below, which in many cases is of but little consequence to its improvement.

But the arrangement and connection of buildings of this fort, as relating to different descriptions of farms, may probably be better and more readily understood by an examination of the annexed plates.

In Plate XIII. (Farm) on Agriculture, is given a full representation of the necessary farm buildings for carrying on grafts and dairy husbandry on a middling scale. At fig. 1. is seen a plan and elevation of a house where the grains, hay, or other similar stylem of farming is pursued. Fig. 2. is the ground plan of the farm; and fig. 3. displays the arrangement or distribution of the several out-buildings or offices.

The excess of completing a set of farm buildings on this plan would, at present, where materials are pretty much at hand, be from four to five hundred pounds.

At fig. 4. in the same plate, are exhibited the plan and elevation of a house of this nature, where the chief stytem purfued is dairying: fig. 5. explains the ground plan; and at fig. 6. the distribution of different necessary offices is displayed.

On this plan, as there are fewer out-buildings than in the former case, a set of proper farm-offices, with the house, would probably cost from three to four hundred pounds.

It must, however, be remarked, that the convenience or disfrence of materials, must render the difference of expense in the buildings very considerable in both these cases.

And in Plate XIV. (Farm) on Agriculture, are shown plans and elevations of farm-buildings, where the stytem of husbandry is of the corn, or of the mixed kind, and the farms of a middling extent.

Fig. 1. is the plan and elevation of the house; fig. 2. the ground-plan of the same; and fig. 3. the distribution of the various out-buildings.

This plan may, in most cases, be finished for the farm of from six to seven hundred pounds.

At fig. 4. are the plan and elevation of a farm-hoise and buildings of the latter kind.

Fig. 4. is the elevation of the house; fig. 5. the ground plan; and fig. 6. affords a view of the situation and arrangement of the several necessary offices.

If finished on this plan, the expense would be from seven to eight hundred pounds.

The materials, in constructing buildings of this nature, should always be of the best kind, as durability is a principal object. See FARM YARD.

FARM HOUSE, is that fort of building which is attached to, and constructed for, the purpose of carrying on the different operations, and general business of a farm. It should be so contrived as that the necessary work may be performed with the greatest ease and convenience. The writer of a paper in the first volume of "Agricultural Communications to the Board," has suggested, that houses of this fort should not only contain every convenience for a family, but have a degree of neatness and uniformity, which, if properly managed, will no more than a dull, irregular building.

It was long since remarked by Cicerellina, that "a farm house should be somewhat elegant, to give pleasure to its possessor, and to allure the wife to take delight in it. It should be built on the most healthy spot of the farm, in a temperate air, such as the middle of a hill commonly enjoys; where it is neither suffer to the summer; nor exposed to the rage of winds and storms in the winter." At present other circumstances mostly regulate its situation. See FARM BUILDINGS.

The size of a farm-house should be regulated by that of the farm, according to a late writer, although not to strictly so as the other buildings; a parlour and kitchen, with dairy, closets, and other conveniences below stairs, and the upper story divided into bed-chambers, are probably sufficient accommodation for any farmer's family. These may be constructed or enlarged according to circumstances, or to the inclination of the proprietor; but it is better to have a little more room than necessary, than not to give enough.

None of the buildings about a farm, he says, admit a greater latitude of construction than the farm house; for sometimes a very small house may do for a very large farm; at other times it would require a pretty large house in a small farm, according to the size of the farmer's family, and, perhaps, to the situation in life he has been accustomed to; for there are many very respectable and worthy farmers whose manners and conversation entitle them to the best accommodation; and it sometimes happens that a landlord will consider this, and build a house for the farmer instead of the farm. There is something, he remarks, to pleasing in the appearance of neatness and cleanliness about a dwelling-house, that even a stranger, tranfiently paying by, cannot help being pleased with a favourable opinion of themselves. He closes along with the idea fixed in his mind of prosperity and happiness prevailing within the walls. How different, says he, the situation felt on viewing a contrary scene; a house dilapid and dirty, the doors and walls surrounded and bespattered with filth of all denominations, and fragments of broken dishes, and dirty dairy utensils scattered in all directions; a scene which must impress on the mind the idea of misery and mismanagement, and a contempt for those flatemans who can suffer such beholders; for in such cases it is generally the female part of the
family who has the merit or demerit of domestic appearances. 
And how easy a matter is it to confitute the difference; a 
little care and attention is the whole secret. It adds greatly, 
the writer thinks, to the beauty and neatness of a dwelling-
house, to have a little plot of garden-ground or shrubbery 
before it: this not only contributes to keep every thing neat 
and clean in front, but is often easier managed than a garden 
behind. After feeling the pleasure and satisfaction of keeping 
this plot in good order, every weed that appears visible 
from the windows will be considered as a nuisance, and 
pulled up accordingly. So great an antipathy to weeds may 
thus be raised in the farmer's breast, that his efforts for 
their destruction may even be extended to the fields; and 
by these simple means a slovenly farmer may, he conceives, 
be so completely reformed, as not to suffer a weed to be seen 
on his farm.

It is stated that large windows add greatly to the cheer-
fulness of a farm-house; the fashions being placed as near 
the outside of the wall as possible. The reverse of this is, he 
fays, a glaring deformity in mott houses in the northern 
parts of the kingdom. There the windows are so small, and 
the fashions placed so deep in the walls, that it gives the 
most disagreeable gloominess to the whole building. This 
is said to be done in order to prevent the fashions from 
the exterior, and a most egregious milllake. The fashions are, 
perhaps, more liable to injury by being deep in the walls, 
than by being placed near the outside, for they receive full 
as much wet, and are not so soon dried again.

It is, the writer says, a common practice, and, with 
many, a general rule, to build the farm-house adjoining to 
the offices. Where the situation will not admit of a better 
arrangement, or in a small farm, to have a few rooms of 
building, this may be done; but in general it is better to 
build the dwelling-house, and any other buildings with 
chimneys in them, a little way detached from the farm 
offices, not only on account of the danger arising from fire, 
but of the disagreeable effects (perhaps unwholesomeness) 
of living in a dung-hill, or in the midst of cattle and fowle. 
If, says he, a farm-house, for the sake of uniformity, is 
to be built adjoining the farm-yard, there should be a con-
 siderable length of wall at each end of it to unite it to the 
offices. But it is certainly better to make the houfe at a lit-
tle distance from the wall of the yard; and whether that dis-
tance is ten feet, or fifty feet, there can be little or no di-
ference with respect to convenience. At the same time 
it is by no means advisable that the farm-houfe should much 
exceed fifty or sixty yards from the offices, as there might 
unquestionably some inconvenience arise if beyond that dis-
tance. In the annexed plans of farm-houses four things 
are particularly attended to in their construction, simplicity, 
uniformity, convenience, and cheapness. In delineating 
such buildings, therefore, there is not, the writer thinks, 
that latitude given for a display of those architectural orna-
ments, which in a higher sphere of buildings are so pleasing 
to the eye, and so truly beautiful when disposed by the hand 
of a skilful architect. Such ornaments are unnecessary in 
farm buildings, and are therefore entirely omitted. At the 
same time a strict attention to uniformity is particularly ob-
ferred; and although the windows are, in general, made 
something wider in proportion to their height than is per-
mitted by the rules of architecture, in order to answer the 
purpose of giving as much light as possible, (the chief use of 
windows,) it is, however, hoped, that no very great or of-
ensive deviations are made from these rules, even in that 
case. The accommodations are calculated to be as conve-
nient as possible in the family way; and by making the 
ground-floors at least sixteen inches, or two steps, above the 
level of the ground, and taking proper care to lay those 
floors, a great deal of that dampness, and consequently un-
wholesomeness, so often complained of, will, he conceives, 
be guarded against and prevented.

Many people, the writer says, prefer, gable-ends, as in 
fig. 4. Plate XV. (Farm) on Agriculture. For his own part 
is, however, of opinion, that hip-roofs, and the vents within 
the buildings, are generally preferable. The hip-roof re-
quires no more materials; and the gable-ends not only oc-
casion more expense of building, but an unnecessary addition 
of weight upon the end walls. Vents built within-side the 
house are less liable to smoke than when in an outside wall; 
besides, they contribute generally to keep the house warm, 
for they act as flues, and diffuse their heat, in some degree, 
all over the building. It must be observed, that the prin-
cipal walls are all delineated, of the thickness of two feet, 
that being considered as the best thickness for rough stone 
walls. Where the stones are good, and of a proper form 
for building, or where bricks are used, the walls may, no 
doubt, be thinner; but, when too thin, the heat of the 
fire in summer, and the coldness of the external air in win-
ter, have so disagreeable an effect, by penetrating through, 
that it is hell to err on the safe side, and to make them of a 
greater thickness. This is really a greater inconvenience, 
for he observes, of brick buildings; for in general brick walls 
are so thin, that these effects are most sensibly felt both in 
the summer and winter seasons.

And by making the different apartments and other di-
visions and conveniences no larger than necessary, the least 
possible expence will, the writer says, be incurred. The 
dimensions of these should be proportioned according to 
the sum intended to be laid out. Very frequently a good 
plan is thrown aside merely on account of the expence of 
putting it in execution; whereas, it should be considered, 
that, by contracting the rooms, and the building in general, 
the same plan may be executed accordingly, whatever 
expence may be determined on. The plans given may 
therefore be varied in size, till of such dimensions as will 
coll no more than the sum allotted for that purpose. For 
these reasons, estimates of buildings, in a general view, are, 
the writer conceives, really of less importance than most 
pople imagine, there being hardly two counties in the 
kingdom where the same plan can be executed at the same 
experience. Even in the same county, and in the same parish, 
the expence will often vary considerably, according to circum-
cances. The distance from materials, the quality and price of 
those materials, the goodness or badness of the roads, 
the nature of the soil to be built on, and, consequently, the 
experience of the foundations, the price of labour, the season 
of the year, and even the state of the weather, all tend to 
make a difference in the expense of building. It is, there-
fore, hardly possible to make a correct estimate, unless the spot 
tended for erection the building is known and examined; 
and an incorrect estimate is much better to be omitted. Some 
people, the writer remarks, will pretend to make an estimate 
without even inquiring into their circumstances which 
must regulate the expence, knowing that when the sum they 
mean is expended, their employer will not inspect the build-
ing on that account. It is best, therefore, to be cautious in 
dealing with some people, unless they will contract for the 
sum estimated.

But in some parts of the country, it is observed, a house 
built on the plan and of the dimensions chosen at fig. 1. in 
Plate XV. (Farm) on Agriculture, may be completed for 
about 70l. or 80l.; while in other parts it may cost 150l. or 
more; consequently, it would tend only to mislead, by stating 
either the one or the other as an estimate of such a building. 

At
At fig. 5, in the same plate, is the plan of a farm-house also
on a larger scale. Yet to commence a building, without know-
ing previously the expense it will cost, should at all events be avoided, as being almost a certain opening for imposition.

The best way, therefore, to ascertain this, is to choose a plan:
if the proposed building is not of that extent or im-
portance to require the aid of an architect, employ any per-
fessor conversant in those matters, whose fidelity can be relied on, to examine the ground, and to consult with different trademen concerning the expense at which they would
undertake to execute their respective parts; a pretty correct estimate may, the writer says, thus be obtained. Or the plan may be laid before different intelligent trademen, and their estimates required, and afterwards examined into, not only as to the charge made, but the manner of executing the work; for it is not always the lowest estimate that is to be preferred. If in either case the sum should amount to
more than is proposed to be laid out, the dimensions of the plan, and the manner of finishing some of the parts, may
be altered, till it is found that it may be executed for about
the sum proposed by the person who intends to build.

And it has been remarked by the author of "Modern Agri-
culture," that, in regard to the share of expense and trouble
which proprietors and tenants in general ought to be sub-
cjected to, in erecting farm-houses, all leas should contain a
clause, by which the proprietors become bound to be at
the expense of materials and workmanship, to the extent of a
slighted sum, rather above than below two years' rent.

The tenants should not only undertake the carriage of mate-
rials, without making any charge for so doing, but also
become bound to keep the houses in good order, and to
relinquish them equal in value at the expiration of the lease,
or to pay any deficiency, as the same may be determined
by proper trademen, mutually chosen for the purpose.

It is suggested that it has been a common practice in some
parts of Scotland, (which ought to be introduced everywhere)
to bind tenants to improve their houses from any damage by fire. This clause in leases is attended with another good consequence, the tenants generally improving their flock and house-furniture at the same time; so that when any accident happens, they are faved from the ruin
which otherwise must necessarily ensue.

But the farmer's capital, it will readily be acknowledged,
ought to be employed in flocking and improving the farm,
rather than in erecting houses; therefore, it is certainly bad
policy in the landlord to divert that capital from those
channels in which it ought to flow freely, and without inter-
terruption. On the other hand, the circumstance of the
tenant being obliged to maintain the houses in good condi-
tion during his lease, and to leave them of equal value at his
removal, would induce him to pay proper attention that
the houses be substantially built, and that every necessary
repair be completed in proper time, and in the most effec-
tual manner. When repairs only are necessary on the
entry, they ought to be promoted at the mutual expense of
the parties. The proprietor should advance the requisite
sum for materials and workmanship, and the tenant perform
all the carriages. A clause should also be introduced into
the lease, by which the landlord may have a right to exe-
ecute repairs, provided they are deemed requisite by proper
trademen, sent to inspect the houses, intimation thereof
being made a reasonable time before to the other party.

This, it is thought, would prevent that heavy load of ex-
pense which proprietors are frequently subjected to when
rents remove, and a mutual interest in the preservation of
the buildings would be formed between the proprietor and
tenant. The tenant, although liable to pay for frequent
partial repairs, would avoid the expenditure of large sums;
and, if bound to leave the houses equal in value to what
they were when he entered, as he certainly ought to be, the
landlord would seldom be put to the expense of large sums
in the erection of new buildings of this nature.

The elevation, ground, and chamber plans of a farm-
house upon a small scale, calculated for a farmer where he
lives with his servants, are represented at figs. 1, 2, and 3,
the plate mentioned above. It may be divided on the
ground floor, as in fig. 2, where a is the entry; b, the
kitchen which should have an oven at k, when requisite;
c, a small apartment off the kitchen, in which a bed may
be placed, or it may serve the purpose of a store-room; &c.;
d, the farmer's private room, or parlour; e, the dairy, or it
may be at c, if thought preferable; f, the hen-house, or
which may serve for keeping or laying up small tools, such as
spades, shovels, rakes, mattocks, &c.

And at fig. 4, in fig. 3, is the chamber floor, which is
only divided into two bed rooms in the plan, but may be
further divided where necessary; h, is a pigeon-house over
the necessary. The dimensions are marked on the plan, but
may be varied to suit particular circumstances and situa-
tions.

The representation of the elevation, and two ground
plans of a farm-house on a larger scale, which by suitable
modification may be proper for a farm of any extent, is
given at figs. 4, 5, and 6, in the same plate. In the
plan 5, it is divided into a, the principal entry; b, the
parlour; c, the family bed room; d, the kitchen; e, the dairy;
f, the pantry and cellars; the three latter being attached to
the back part of the house by a continuation of the same
roof downwards.

By only permitting the ceilings to be eight and a half or eight feet in height, some small bed-
rooms may be provided above them, having a few steps down from the floor of the front rooms, or a few steps up from the first landing place.

In many places farm-houses are constructed on this plan.
And the eard of Winchelsea, at Burleigh, has one erected
in nearly a similar method; but in it the back-door of the
kitchen enters into a brew-house and wash-house; the fire
place and copper behind the kitchen vent. Beyond this
brew-house is a place for holding fire wood, set in the
back wall of which are openings to feed the fire with.

In the kitchen is an oven; and below the grate an ex-
cellent contrivance for baking occasionally, but chiefly em-
ployed for the purpose of keeping the servants' meat warm.
It consists of a plate of cast iron, with a door similar to that
of an oven.

The up-stairs part is divided in the front into two good
rooms, and into two small ones on the back part, but may
be easily further sub-divided where necessary.

And at fig. 6, it is shown another mode of dividing the
ground floor of the elevation fig. 4, in which a is the
parlour; k, the kitchen; c, the closet; d, the dairy; e, the
pantry; f, the coal-house; g, the poultry-house; h, the
fly-leaf, which has an opening to the kitchen; i, the back
entry. The chamber-floor may be divided likewise, where
it is requisite, into two good bed rooms, and a light closet
able of holding a bed, or in any other way that may be
thought more convenient. It would be easy to introduce a
variety of other elevations and plans for constructing farm-
houses upon, with perhaps other advantages than these,
but in detached situations from the houses: these examples
may, however, be sufficient for affording hints for erecting
them fo as to suit farms of all extents and descriptions.

Farm Lands, in Agriculture, such lands as are in
the occupation of tenants, or held in the rate of farms.
FARM.

FARM MANAGER, a person who has the overlooking and directing of the business of a farm; the same as bailiff, and land steward. See Bailiff and Land Steward.

The proper overlooking and managing of a farm is a business of much greater difficulty and importance than is generally supposed. It will demand the whole attention and time of the person who engages in it; and must, in fact, constitute his principal amusement, as where he is apt to be drawn off by other pursuits, it seldom goes on well. In order to proceed in it with ease and convenience, it is proper that he should keep a constant look out upon the concerns which are to be performed, unless this he well attended to, he will be frequently liable to error and miscalculation, and much will often be left undone which ought to have been executed. It is essential that he look forward to the concerns at a proper time, for the land labour for some months, and to hand labour for a few weeks, as the season of the year may direct. In this he will be greatly aided by the keeping of a proper bill of the several fields of the farm, with the crops they have severally produced for different years past, and the manurings which they have each had.

From this list, the arrangement of crops which are to be cultivated the ensuing year should annually be made out in the autumn, classing the fields according to the purposes for which they are designed; as by this means the quantity of each of the crops will be known, as well as the extent of failure; consequently the amount and strength of team, and other labour, be fully pointed out, in order to be duly provided for; the different crops be put in proper time; and the summer flock be apportioned with exactness.

In the same, or other list, memoranda should likewise be kept of the works to be done directly and in succession, in every department of the business, so that every thing may proceed in the most regular and proper manner, and nothing be overlooked.

In conducting the execution of the work, whatever the nature of it may be, caution and prudence are highly requisite, as well as an invariable attention, never to attempt too much, or to begin any part of undertaking in the way of improvement, without the greatest probability of finishing it in due time.

Besides the above, there are several other points in which the good management and correct conduct of this sort of farm-tenant is known, as:

In keeping the farm-yards and buildings in neat order, and perfect repair, as well as free from all sorts of obstructions to the business which is going on in them.

In taking care of the various private roads of the farm.

In preferring the fences in general good repair, and taking proper care of the young hedges, as well as of the timber raised in them.

In seeing that the gates are taken in a proper manner, and prevent the straying of loose flocks.

In taking care that drains and water courses are kept properly open, for the effectual discharge of superfluous water.

During the summer season the watering places of live flocks should be well attended to; as well as the state of the pastures, and the proper shifting of the pasturing flocks.

The weeds in the grass lands, as well as in the tillage grounds, should also be carefully regarded, to see that not a thistle blows, or any other weed ripens its seed, either in the open parts, or the borders or banks of them.

In the winter season live flocks becomes the chief object of the manager's attention, not only to take care that they are properly supplied with suitable fodder and water; but that they have sufficient shelter and convenient feeding places.

And the watering of grass lands is another matter which deserves particular regard from the farm manager at this period of the year. It is, however, a sort of work which requires nice attention in its performance.

There are likewise various other points of farm management which may be equally deserving of regard by the person employed in directing the business of a farm, though of much less importance than those which have been noticed.

While the work of the farm is carrying on in the fields, it is the province of the manager to be frequently with the work people, to see that his directions are properly attended to, the different operations executed in a proper manner, and the necessary dispatch observed in performing them. He must be frequently passing from one set of work people to another, keeping a steady eye upon the various kinds of work which are going on, and directing such additional aid as may seem requisite in particular cases, especially where team labour is performing, in order that the whole business may be conducted in the most profitable way.

In directing the work of teams, an even steady pace should be maintained, both in the view of the animals, and the labour which they are to perform, as hurrying them never answers any good purpose. On particular occasions it may be requisite to have recourse to as much expedition as possible, in which cases the example of the manager, and the holding out of suitable rewards, where necessary, may be the most proper incentives to exertion. Under all circumstances, laziness and trifling should constantly be held in the utmost detestation and contempt by the director of a farm, as being equally fraudulent with that of little pilfering. And their strong reproach has not unfrequently an useful effect on the farm labourer.

The proper regulating and directing of farm servants, and those work-people who are employed, form an extremely difficult part of the manager's duty. The best method is probably that of encouraging such as are good by every proper means, and never suffering bad ones to continue. It is always the best policy to pay good wages, and have the best workmen that the situation affords, as these are often the cheapest way, and those which are not only of a better quality, but also of a better quality, will be the most proper incentives to exertion. And their strong reproach has not unfrequently an useful effect on the farm labourer.

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quietly becomes essential for the manager to give his orders personally, and when it can be done, even upon the spot, to such workmen as are to execute them, as he can there fully explain himself to them, and where necessary, assist them in finishing up the works. The able manager, therefore, constantly attends in person, in beginning new works, and where they are out of the common line of husbandry, remains with the workmen directing them, and returns occasionally to them, until he finds them completely in their work, as, without much attention, much time and labour would often be thrown away.

These, and various other reasons, render it necessary that a farm manager should be perfectly conversant with every sort of agricultural business and operation, as well as with the nature and management of all kinds of tools and machinery, as, where this is not the case, the work of the farm can never be properly directed. When he is deficient he must of course endeavour to perfect himself as speedily as possible by incessant practice. Without some degree of perfection in this way he cannot be able either to detect or correct indifferent workmen, or know when to be satisfied with such as are good, as they will not hear to be found fault with improperly. It is only by such means that he can be enabled to discern when the business of the farm is executed in a proper manner.

In his dealings, and general intercourse with other persons, the farm manager should be particularly attentive to punctuality and the keeping of clear accounts, as upon these his character will in a great measure depend.

Where the transference of the accounts of a farm are required at stated periods for the use of the proprietor, the following method may be adopted.

First, A weekly account of labour, with a journal of the works which are going on, each day, and short notices of such transactions and occurrences as may have taken place during the above period, and are of use to be known.

A proper form for this purpose is necessary to be provided, which consists of eight columns, ruled in a perpendicular manner on a large sheet of paper. The first for containing the names of the teams and workmen, and the last for a money column.

The fix intervening columns are for receiving the different works of the six days of the week.

Across these columns are drawn horizontal lines, the uppermost being wide, to receive the works of the several teams, whether of oxen or horses: the roll, of ordinary size, for those of each servant or workman; their several employments, each day, being entered on the lines which lead from their respective names; and the day's wages of labourers in the money column, at their terminations.

Secondly, A monthly account of receipts and disbursements; including the weekly payments for labour; and shewing the balance of money in hand at the end of each month.

Thirdly, An annual account current, consisting of the several totals of the twelve monthly accounts; including the manager's salary; which shews the state of the account at the end of the year.

Fourthly, A granary account, shewing the several quantities of grain of different kinds threshed out, with the discharge or expenditure of every part or parcel of the same. And a similar account of every other sort of marketable produce.

Lastly, An inventory account, taken at the close of each year by persons appointed for the purpose by the proprietor; containing every thing of value on the farm, as live-stock, crops, manure, implements, &c. And a general report of the state and condition of the farm, as well as a list of outstanding debts and monies due on the day of settlement.

By striking the balance of the whole, the profit or loss of the farm will be satisfactorily known.

Farm Offices, a term frequently applied to the different out-buildings which become necessary in the management of a farm. They are of very different descriptions according to the nature of the management which is to be carried on; and it is a very essential point, as has been seen, already, that they be distributed in a proper and convenient manner for the Fort of the various types which is to be performed in them; as by such means much time and labour may be saved to the farmer in the performing of his business, as well as in the foddering and taking care of his live-stock.

See Farm Buildings and Farm Yards.

Farm Servants, is that sort of servant which is engaged in the performance of some part of the necessary business of a farm. These servants are of various descriptions, as bailiffs, ploughmen, yard men, &c. There are likewise cow-men, dairy-maids, &c.

In the hiring, or engaging of all sorts of servants for the purpose of farming, great care and circumspection are necessary to ascertain that they are fully competent to the execution of the sort of work which they wish to undertake, as, where this is not the case, much injury may arise to the farmer from their improper conduct or example. And as much of the improvement of agriculture must necessarily depend upon them, they should be kept in a regular manner, and with a proper degree of subordination, in order that they may be ready to perform whatever is properly required of them by the master or his bailiff. Without this the business of a farm cannot go on with propriety, or in a beneficial manner to the proprietor. The number should likewise be well-proportioned to the nature and extent of the farm, as well as the work to be performed, as the loss is considerable where this is not the case.

By the author of the "New Farmer's Calendar," it has been noticed that Old Michaelmas is the usual time for hiring farm servants throughout the country, but he acknowledges himself entirely of Mr. Marshall's opinion, that it is one of those customs which ought by all means to be changed for a better. Michaelmas brings with it a great number of business men, &c. of the sort, after servants at that time, or even to admit new ones, entirely unacquainted with your peculiar methods and management, is extremely inconvenient. Old Christmas, as a reason of more leisure, would purely, he says, be a more proper period for this affair. As to farming-servants, the bailiff counsel he is able to give is, for an employer to receive no knowledge or iller, to give the greatest possible encouragement to overlook trifles, and to trust implicitly to no man's honesty or industry, but to put both to the severest test; so that he must have a choice of the best labourers in the country, and enjoy the profitable reputation of the best master. In a small concern a farmer may himself superintend his whole business; but a gentleman-farmer, or the cultivator of an extensive tract, particularly if managed in the more varied style of the new husbandry, will be contended, require a bailiff, and over-lockers, in proportion to the extent of the business. The bailiff of a gentleman who cultivates a hundred acres of land for his convenience or amusement will have leisure to work himself, which is impossible, or rather totally out of question, with one who has extensive business to superintend, since that alone, if he be inductions, will take up his whole time, early and late. In very large business, a bailiff will need occasional lookers-on under him.

A bailiff ought to have had some years experience of at least
F A R M.

lead the common methods of husbandry and gardening, of the management of all kinds of live stock, and of buying and selling; he should be able to keep common accounts; in short, he must be something, either from nature or habit, above the common labours. But then he must have bailiffs over him; and such must be the proprietor of the bailiff, unless he rather choose to rilk the consequence. As to entrusting these upper servants with buying and selling corn and cattle, he would advise no person to do it, except, indeed, those whose situation is so elevated that such engagements might be thought inconvenient and improper: still it is no derogation from the honour of a prince to be well-informed of market-prices, and to be able, by inspection, to form a judgment of the worth of cattle. He dwells a little on this head, he says, because he has seen too much both of the gross ignorance and iniquitous collusion of bailiffs and managers in bargaining. It is a common saying, "Oh! your master is a gentleman, he don't want to get money, but we must live!" Indeed it is no wonder that gentlemen so often farm their own estates to lots, considering the foolish ignorant, and knavish instruments which they employ under the name of bailiffs. It is recommended by some, to sell a bailiff with full power of discharging the servants and laborers; the propriety of which he is rather inclined to dispute. Involved with such a power there is no check upon his conduct; whereas, were this particular made matter of reference to the principal, all necessary information on both sides would come out. One of the first qualifications of a bailiff is, the writer says, to have a mind perfectly indifferent to all prejudice in favour of the old system of husbandry; and where things are upon an extensive or improving scale, it ought to be an invariable maxim to receive no servant or labourer who will not positively agree to follow directions; in default of which, he ought instantly to be taken before a judge of the peace. He has known several instances of a combination among the ploughmen not to work without their accursed number of horses, &c. See Bailiffs and Labourers.

The author of "Minutes of Agriculture" has, many years ago, on the molt mature calculation, stated the annual expense of a man servant, maintained in the house, to be not less than thirty-five pounds, and that of a boy not lower than twenty-three pounds, supposing the yearly wages of the former to be ten pounds, and those of the latter three pounds. Now, says he, the expense of a day-labouring man for the whole year, were he to work every day, would not be more than twenty-seven pounds ten shillings, which makes a difference of seven pounds ten shillings, against keeping a man in the house by the year, and that of hiring one by the day. And that of a boy is still more in proportion, as the expense of a day-labouring boy for a whole year, allowing him to work every day, is only thirteen pounds, which makes a difference of ten pounds, or more than three-fourths of the boy's day-wages. In this account no deduction is made in the daily pay for rainy days; consequently, the impropriety of keeping plough-boys in the house is considered very obvious; and though it may be convenient to have the carters about the house, the convenience is not conceived to be worth the annual sum of ten pounds seven shillings. It is, therefore, advised to put a woman into a cottage within a small distance of the farm-yard, to take such servants as lodgers, and to keep in the house no more farming servants than a butcher and a yardman. It is absolutely necessary to have somebody about a farm-yard in cafes of emergency; but the above two are quite sufficient, as the carters in the adjoining cottage will be nearly as handy as if they were in the house. Such a measure can, however, only be local, though the hint may have a general tendency. It is probable that the farmer who keeps no accounts may imagine he saves money by boarding his servants in the house; but if he keep them in the luxurious manner in which servants of this fort in general expect to be kept, he will be greatly mistaken. The farmer who sits at the head of his kitchen-table may, indeed, without doubt, feed his men much cheaper than a person who eats in a separate room; yet the observation is just, that one fed by his master costs the community as much as two who provide for themselves; for discharge a grumbler, one who pretends to be dissatisfied, though in fact only fatigued, and he will return to his bread and cheese with, perhaps, equal health and equal happiness. He fits down to his master's table with a resolution to eat voraciously of the bread, to do him all justice; but at his own table eats sparingly of the maccu, to save his money; fell interested being his motive in both cafes.

The rule that has since taken place in the expense of servants, in every part of the country, has led to fuller being kept in the houses of the farmers. But in this there is also considerable disadvantage; they are less obedient to their masters, less in need of characters when they change their situations, are less cheaply kept, consequently raise the price of labour, and liable to the losses of much time, from being out of employ. Besides, they have more opportunities of drinking and associating together, by which combinations are apt to be formed for preventing the introduction of new implements or new modes of husbandry. And great inconvenience is often experienced from the irregular manner in which they come to work, or their not coming at all. The servant who lives on the farm is likewise much more interested in getting forward with the work which is necessary to be done than the mere day-labourer; and there is much less inducement for him to carry away different articles with which he is entrusted, as corn, hay, &c. from his not being able to keep any for animals to consume them.

It has been strongly advised by an able writer on rural economy, to employ active young men as much as possible in performing farm work, especially during the hay and harvest seasons, as a few such as are idle and sluggish soon spoil all the others. "Mix," says he, "two or three old women, or two or three boys, with a company of men, and the effect will be very soon visible; for the men will conform to the ways of either the old women, or the playmates of the boys. It is not prudent to employ many women with the men; and nothing but necessity can excuse it. Two women, after the first or second day, will do as much work as half a dozen alone. It it he necessary or convenient to employ a number of both men and women, it is but common good management to keep them separate; with this exception, which may be laid down as a maxim, namely, one man among women, and one woman among men. A crafty conceited old fellow will check the glibbing of the women; and it has been remarked that raking after a young man has animated as much as a gallon of ale. Two are dangerous; they breed contention, and rather retard than accelerate. The most valuable servant in harvest is a good ploughman. It is necessary to common management, that he should be able, willing, and careful. Every pitch of hay and corn, generally speaking, pales twice through his hands: he loads and unloads, which are the two most laborious tasks of harvest; he drives the team backwards and forwards; if he botters by the way the field-men or flack-men must stand idle; if he spils or overturn his load, or if he break his waggon, or let his

horses,
Farm.

Horset, the arrangement of the day is broken; and, perhaps, the damage done by the loss of time rendered irreparable by the next day’s rain. A good carter will not suffer his waggon to be over-loaded. The field-men, too, that is, the pitchers and assiduous loader, should be yong and active, and well matched with the carter.

It has likewise been suggested, that the managing servant of a farm should be attentive to a variety of other points and circumstances, in directing the business of it. Nothing, it is contended, contributes more to facility and satisfaction in it than a forecast toward works which are to be done. A miscalculation is ever to be dreaded as a mischance; and, when it is brought on by a want of forethought, it brings with it a degree of difficulty, and a train of unpleasant reflections, which four every enjoyment. This sort of servant, it is hinted, should have a forecast toward crops for three or four years, toward team labour for as many months, and should look forward with the view of hand labour for some weeks, according to the feason of the year. And in order to bring the matter to a degree of certainty, it is highly requisite to make out a list of the fields or parcels of land of which the farm consists, with the crops which each has borne for some years back, together with the manu-rings which they have severally received, in order that the future treatment of each may be decided upon with proper accuracy: and every autumn to form, by the assistance of such lists, an arrangement of the crops that are intended for the ensuing year, chaffing the fields or pieces of land according to the purposes for which they shall be intended; thus ascertaining the quantity of each crop, whether arable or grass, as well as the quantity of ground intended for pasture, in order that the quantity of team labour may be distinctly foreseen, the required strength be estimated from time to time, and the several crops be sown in due season; and, in order that the flock of the ensuing summer may, in due time, be properly apportioned to the intended quantity of pasture ground, as well as that the works of summer and harvest may be conveniently before the eye, and proper hands be engaged in time to perform them in season. And a fort of memorandum list is advised to be kept of the busines to be done immediately or in immediate succession, whether in relation to crops, or to any other concerns of the farm, that nothing may escape the memory; and that the most requisite may be brought forward first, or another which is more suitable to the state of the weather. In this, as in other busines, the principal object to be aimed at is that of injuring fewest, which is not only profitable to an employer, but satisfactory to the person employed. Whereas, a miscalculation injures at once the property of the one, and the character, as well as the peace of mind, of the other. Hence a farm manager ought to engage in a work, whether of improvement or ordinary practice, with caution, and to proceed in it with attention and simmicks. A standing rule respecting this main object of management is, not to attempt too much; and never to begin a work without a moral certainty of being able to finish it in due season.

It may be observed, that, besides the common work of a farm, as the culture and harvest of crops, the rearing and fattening of live stock, and the busines of markets, there are many other objects of attention which ought to be constantly kept in the mind, or the mind’s way, of a manager, as on them the difference between good and bad, between correct and flowery management very much depends; such as keeping the home-blind in repair, and free from impediments, attending to private roads and drift-ways, keeping up fences everywhere in thorough repair, attending parti-

cularly to young hedges, and to the rearing of hedge row timber, the fencing the gates swing clear and catch with certainty, equally to preserve them from injury and to prevent loose flock from going astray, the attending to drains and water-courses, to see that superfluous waters have free passage to their proper outlets, and that they be readily discharged; and that in summer strict attention be paid to drinking-pools and other watering places of flock, as well as to the flat of paddurage, and the shifting of pasturing-flock; likewise to weeds, as well in grassy grounds as in arable lands, to see that a thistle blow, nor any other weed mutes its feed, either in the areas or on the borders of fields. And in winter much care is necessary not only to see that the flock are regularly supplied with proper fodder, but that sufficient shelter and comfortable resting-places are afforded them. At this season, too, the watering of grass lands should be attended to, as much as the nature of the situation will admit; and to the accumulation of murrage an unremitted care should be bestowed the year round, as much depends upon it. On the whole, the performing these and other objects with propriety requires repeated every season; each of every part and particular under his care, committing to his memory whatever demands his more immediate attention; so that whether he is on the spot, or arranging his plan of operation in the hour of leisure, it may be preset to his mind, and take its proper course.

The busines of a managing servant, during the time of work, lies in the field, in executing the plans he has formed, in passing from one lot of work-people to another, not more to see that the different operations are rightly performed with proper dispatch than to order any required assistance (to the teams especially) in order that every part of the machine may be kept in profitable motion. In the ordinary operations of husbandry, and on common occasions, a steady even pace should be recommended, equally for the good of the working animals and the work which they are performing; yet there are times when quick dispatch is necessary, and then it is his duty to encourage good speed by his example, and by promises of reward, if the occasion require it. At all times, and on every occasion, idleness is a crime which ought not to be suffered to pafs with impunity. It is a direct fraud; and a manager should guard against with the same care and affiduity as against pilfering. A day labourer, who idlcs away an hour, robs his employer of an hour’s wages; and thereby injures him as much as if he were to steal a farrow of equal value. This is a truth which requires to be deeply impressed on the minds of labourers, as the impression has been known to have had a good effect. It is, however, judiciously observed, that the right ordering of servants and work-people is a difficult branch of moral duty, and which forms an important part of that of the manager of a farm. They require to be treated according to their respective merits; encouraging good ones by extra wages or other rewards. Some men are worth double the wages of others, as day-labourers; yet custom makes no distinction between them in this respect! Hence the propriety of engaging the best workmen the country affords, and retaining them by civil treatment and suitable encouragements. The managing servant should constantly keep his work-people at a proper distance, without destroying that free communication of opinion respecting the work in hand, which, on ordinary occasions, every intelligent workman should be allowed. A standing rule of conduct in the ordering of workmen is, never to find fault without occasion, nor to commend without reason. Good fellows will not break the former, nor will bad ones be needled by the latter. But it is right to habituate workmen in general to...
be told of their real faults; first in the mildest terms the occasion will admit of, referring the warmth of temper for extraordinary occasions; and then it is prudent to fling them with keen, rather than to load them with heavy words, to endeavour to stir up their pride rather than their malice or resentment. Much of the smoothness and uniform success of business depends upon the manner of communicating orders to workmen. If orders be loosely or inaccurately given, it is unreasonable to expect that the execution of orders should be faultless. It is difficult to explain business in words with sufficient accuracy to rustic workmen; and if a third person is suffered to intervene, errors are inevitable. The managing servant should therefore make a point of giving orders in person, and, if possible, on the spot, to the men who he means shall execute them. Then he can explain himself to them intelligibly and fully, or affix them in marking out their work. There is always danger in merely verbal orders, and in a message certain mischiefs. It should be a constant rule with him to set his men to a fresh work in person; and if it be out of the common way of husbands, to lay by them or direct them with his own hands, and return to them again and again until he finds them completely in their work. In this view, as well as for other reasons, this sort of servant should be master of every implement, tool, and operation belonging to his profession; and if he should find himself deficient in any particular, he should practise it, day by day, until he makes it familiar to him; or he is to correct a bad workman, or to know when to be satisfied with a good one, who, knowing when he is right, will not bear the reproaches of ignorance? He has no other way of securing the elench and attachment of good workmen, and of making in a workman-like manner every thing that he undertakes, than by making himself master of his business; without which little satisfaction will arise from it to himself, or profit to his employer. And in the general principles of conduct, in his dealings and intercourse with other men, punctuality is one of the most essential. Method is the best assistant of punctuality; and clear accounts are some of the best refuits of method. These should invariably be kept with accuracy, and be sent to the proprietor in weekly, monthly, and annual periods, so as to shew the daily state of the work, the monthly state of receipts and payments, and, lastly, the whole state of accounts and balances. In this way a variety of evils and errors are checked and guarded against.

There is a great variety in the methods of engaging and employing farm-servants. In most of the more northern counties it is the custom to hire them by the year, in which case they commonly live in the house. But in many of the southern districts this is not the case, they being nearly, if not wholly, in the situation of day-labourers. And this method, though, by no means to be commended, for the reasons already noticed, seems on the increase, probably owing to there being some hardship in the family. There are likewise different customs in the manner of employing them. In Surrey it is mostly an established rule for every man in the harvest season to work by the acre, or the month, and not by the day. Where a labourer is constantly employed through the year, he expects in the harvest to be constantly employed in mowing, reaping, and other works of this kind, by the acre; or to have his harvest month; that is, an advance of wages certain, wet or dry, during that length of time, commencing when it is the most suitable to the farmer. This is a convenient practice, as they are always at command in cases of emergency, and nothing but the continuance of rain till the barns are empty can render them burdensome. In many other districts, practices somewhat similar are found to prevail, and have an equally beneficial tendency. In these cases they are not allowed, in general, to regard any particular hours in the work, though in other cases the hours of labour are mostly in the summer from six in the morning to six at night, and in winter from the time that it becomes light until it is dark.

The rates of wages are so very different in different places, that it is almost impossible to reduce them to any order; but in most districts they may stand somewhat as below.

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<td>Ploughman</td>
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<td>Carter or waggoner</td>
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<td>Bailiff or yard-man</td>
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<td>Boy</td>
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These wages are exclusive of bed, board, and washing in the house. In most of the northern counties they have been nearly doubled in the course of the last twenty years. And in those of the south the rice has been equal in most places, but in some considerably more.

Many suggestions have been offered by writers on rural economy, in regard to the means of regulating the rate of wages of farm-servants and labourers, but hitherto perhaps, with little success. In the "Agricultural Report of the Board, for the West Riding of Yorkshire," it is stated that the only mode of making them proportional to the rice or fall on the value of money and provisions, is, to pay them in kind; that is, with a certain quantity of corn, as the parties may agree, which, at all hazards, infures them a comfortable subsistence, and prevents them from a daily or weekly visitation of the markets. Where they are paid in money, it is supposed to expose the thoughtless and inattentive to a variety of temptations, but that when paid in kind that they cannot raise money to gratify the whims of the moment. It is hinted, that in those counties where this mode of payment has been long established, the ploughmen and labourers are on the whole better fed, live more comfortably, and rear healthier children, than in those parts where, from being paid in money, the currency of the article facilitates the expenditure, and prevents them from laying by a stock of provisions for their support, when out of work, from accidents or diftresses. In the part of the country where the writer resides nearly the whole of the farm-servants are paid in this manner. They have a certain quantity of grain; maintenance for a cow, summer and winter; a piece of ground for planting potatoes, and raising flax upon; and whatever fuel they require driven gratis. These with the privilege of keeping a hog and a few hens, enable them to live, and bring up their families in a comfortable manner; and while their income is considerably less than people of their station in other parts, they are on the whole better fed, better dressed, and enabled to give a better education to their children. Placed under these circumstances, they are a respectable set of men; and for frugality, faithfulness, and industry, they will bear a comparison with their brethren in any quarter. It is consequently advised to introduce a similar method of paying farm-servants into this district, which, although it might at first be attended with some difficulties, would contribute to the public good, and to the advantage of the labouring peasantry in various respects. The writer of the "Report for the County of Hereford," has likewise stated, that if a certain proportion between
between the price of labour, and the average price of wheat, could be fixed by law, so as to render the applications for parochial relief necessary only in cases of very large families of rural illiterate, of incapacity, or any other real emergency; the measure, if it is pursued, would be honourable to the country, would stimulate industry and fidelity, check idleness, and endear to their native soil a numerous class of useful persons.

In attempting any plan of this nature, various difficulties, both of a local and general kind, would present themselves, which no scheme that has yet been brought forward, so far as we know, seems to have sufficiently provided against.

Farm Servant's Rooms, the buildings or other places where servants of this kind sleep and lodge. These rooms, especially where the farms are large, should always, if possible, be quite distinct from the house. Where the farms are of much extent, and consequently a great number of servants wanted, particularly where they are unmarried, suitable and convenient rooms for sleeping in, and where they find their own provisions, for preparing and dressing them in, are not merely requisite, but of considerable advantage to the farmer, as well as the men, as they face much time, which would otherwise be lost, in going to their meals; besides keeping them together in a sober, steady state, ready for their different employments. In this way, too, the servants are a great deal more comfortable, and live far more cheaply than when they go to the public-houses to eat their meals, as is much the case in the more southern parts of the kingdom, and by which their manners too frequently become depraved, their constitutions enfeebled by intoxicating liquors, and much useful time often lost to their employers as well as themselves.

But inconveniences of this kind are probably the best guarded against by having such servants, when it can be done, in the houses of the farmers, in which cafes the eating-rooms for them should be so placed as that a facility may be given of over looking them. But the rooms for lodging in should, at the same time, be quite detached and distinct, as being the safest and most proper when considered in that way, as such persons are frequently careless and negligent of their candles and fires, besides being irregular in other parts of their conduct. In whatever situation such rooms may be erected, it is essential that the ground floors should be formed of stone, brick, or some other incombustible material, while the upper ones are laid with plaster, as in some of the midland districts. Or, as being more readily laid, brick in some cafes may be had recourse to. See FLOOR.

Farm-Yard, in Agriculture, is the area or plot of ground, on the sides of which the farm buildings are erected, and which for the most part adjoin, or is connected with, the house. It is the space of ground that comprehends the live flock, and in which they are foddered, the dung prepared, the tools laid up, and the various necessary operations of the farm executed. It is a matter of the utmost importance to the farmer to have these yards conveniently formed and arranged, as, where this is the case, there is a considerable saving of both time and labour in performing the different kinds of work in them. Yards of this kind have very different sizes, shapes, and dispositions of their buildings, according to their situations and other circumstances. One point of view should constantly be, that of giving the yard which is to be covered, of whatever sort it may be, a progressive course from the barn-yard or stack-yard, through the cattle-houses and sheds to the dung-heap, without incurring unnecessary labour in carrying it different ways.

And another point that should be particularly attended to is, that all the different materials which are converted to the use of animal food should pass from the kitchens, dairies, and other places, to the hog-stye or other convenient places of consumption for them. By a nice attention to the distribution of the buildings, in forming such yards, many other advantages and facilities may likewise be given to yards of this description.

The author of "Modern Agriculture" has remarked, that a farm or foddering yard on a suitable plan is well known to be an highly requisite appendage to all such farms as are well regulated, and is considered as indispensable by the most enlightened farmers. Where the farm buildings are erected in the square form, the court yard ought to be paved to the extent of nine or ten feet from the bottom of the walls all round. The earth should be excavated from the remainder, so as to form a hollow towards the centre. Then a thick coat of gravel, or, what is better, chalk, should be laid over the whole, which would answer the double purpose of keeping the place dry, and facilitate the shovelling up the rotten dung. Care should also be taken to have proper drains to carry off superfluous water, in order that the yard be kept dry. It would be very advantageous to have a pond for the reception of this superfluous water, which should be fo placed as to flood any of the adjoining fields in pleasure, during the proper season.

By the writer of the "New Farmer's Calendar," it is observed, that it would be nugatory to hold forth about aspect, straight lines, or right angles, in the formation of a farm-yard: such conceptions will ever be postponed to those of local convenience; it will be sufficient to insist, that the space be ample and properly divided, the offices sufficiently numerous and commodious, and the whole sheltered on every quarter. In the arrangement of the offices, namely, the dwelling, barns, stables, cattle-houses, and sheds, the material objects ought to be such a position as may contribute to convenience, and the abridgment of labour, as already noticed, and at the same time afford the largest possible proportion of shelter; this last, however, must obviously, the writer thinks, gives way to the former consideration; and, as a supplement, all the vacant places or exposeds may be well barricaded with a lofty, warm, and substantial fence. Mr. Marshall's idea, of an angle of the buildings precedent in the position the two sides would afford shelter in the most material respects, from the north-west to the north-east, is, he thinks, happily conceived. Respecting the number of yards, no positive rule can, he says, be expected any farther than to state, that, in the smallest concern, a division is necessary, and in those of greater magnitude two main yards, with appendages for stacks and other purposes, conveniently situated, will properly describe the home-fell. A barn seems the natural division of two yards, since it will serve the common purposes of both.

The description of the plan of a farm-yard is afterwards offered to the attention of the farmer. A circle of sufficient extent being marked out, and the area properly levelled and hollowed in the centre, the whole of the needful farm-buildings of every description, barns, granaries, milk house, stables, ox- and cow-houses, pig-eyes, flower-rooms, and sheds, are to be erected around, in the most convenient order in point of useful conformation, and with reference to sheltering the places to be used as cold and exposeds. The area being to spacious that the buildings will not completely surround it, except vacancy is to be filled up with a good fence; with or without a lean-to and roof, as a shed. As many of these sheds as are required may be run up against any of the buildings.
that none of the cattle of the fold need be abroad, or feed in the rain or snow. Divisions and sub-divisions may be made at will, with hurdles, faggots, or poles and rails, for the purposes of every requisite separation of stock. The number and position of the entrances to be regulated by local convenience, the gates being bound to render the security complete. The fold-yard must be formed without the circle, the corn-flacks being placed within the least distance possible of the barn or threshing-machine; those of hay and straw in an equal degree of convenient proximity to the backfides of the flables and cottage-houses. It is obvious that the back parts of the buildings will afford convenient walls for hens or creations of any kind, should a very large flock or peculiar circumstances render it necessary to fold a part without the circle; the communication, or rather the whole fyllen, may, it is ascertained, be rendered complete, by furnishing all the principal buildings with entrances for cattle backwards, as well as in front. In the investigation of this scheme, however, it will chiefly be perceived, that a mere pedantic literal adherence to the figure of a circle, to which every other consideration must yield, is not so much intended, as a generally round compact inclosure; nevertheless, it seems that the nearer the figure approaches to a true circle, the less will be the waste of ground and expense in fencing. Although not absolutely necessary, it would be a point of great convenience, it is suggested, for the backside of the dwelling-house, confining of the dairy and other offices, to form a part of the fold-yard circle. The wall of every kind from the kitchen and dairy should be faced, with the utmost care, and led by proper sinks and pipes into a capacious underground cullern, from whence it may be pumped into the houghtroughs, the flyes being placed within a reasonable distance for the sake of that convenience. Adjoining the dairy should be found the cow-houses and fatting-houses for oxen; the pig-flies next; between the flies and ox-flies is a handy situation for a boiling and washing-house, in which an oven also, or kiln, is an excellent convenience. The lots above the different offices might, it is suggested, communicate by doors through their several partitions, with the granaary, threshing-mill, and barn, affording the convenience of wheeling facks of corn, or chaff, to every part. Room above or below must be afforded likewise for hay, potatoes, cabbages, and every other article of provision of that species. In feeding flailed oxen, to approach them at the head instead of the feet is much the bell method; for which end a gang-way, sufficient to admit a large barrow, may be left between the wall and their head-boards, these being made to slide. Such is the practice of several dillill-houses which feed oxen; and it has been recommended, where cattle feed at racks appending to the barn-side, to have sliding boards, through which the thresher may pull the straw, without having to quit the barn, in order to replenish the racks. A chaff-house should be connected with the barn; and we will suppose the opposite range, whether flables, heds, flore or cattle-houses, to have an appropriate share of these conveniences of connection already listed, that as little waste as possible may be made of time, labour, and materials in executing the farm-yard business.

And it is farther suggested, that, in an extensive farm, where it is ever inconvenient and expensive to cart manure to the dilant grounds, the great convenience of out-flacks appears very striking. It is not meant to intimate that there are never any out-yards upon large farms, but that they are not in general enough attended to, so as to render them of sufficient utility. A yard of this description, well fenced in, might, it is suggested, contain a cottage for a labourer and his family, a stable for a plough-pony, with heds for straw, cattle, and sheep; but threshing in dilant barns is imprudent; and of two evils it would be the least to cart the straw from home, flacking or housing it at the out-flacks. These different hints deferre to be well considered by the proprietors of farms before they begin to erect farm conveniences of this kind.

There are likewise a few other objects that demand particular regard in forming new farm-yards. A great variety of opinions have been offered in regard to the nature of the situation for receiving the flack and yard manure, it being by some considered the best on a surface which is perfectly level; while by others it is conceived better where this is a little raised; and by others again, who are very numerous, the hollow is, on the contrary, decidedly supported as the best. And to this last the author of the treatise on "Landed Property," is, from long experience, inclined to afford his assent. But though he thinks it should be hollow, it does not follow that it should be deep. Its principal use, besides, that of holding the dung, being to bring the rain water falling within the yard into the latr of flagellation, and let it pass off superficially, so as to prevent any thing of a ground current from carrying away the dung, either in a mals, or thick fluid condition; merely suffering the more watery particles to run off into a refervoir or receiver, constructed for the purpose of preparing or preferring them for being made use of afterwards. Is suggested, that two feet on the lower side, or deep part, may be a mean depth; the bottom of the waste water channel being laid six or eight inches lower than the rim of the hollow or bason; the depth of water that it can contain, when free from dung, cannot be more than sixteen or eighteen inches, and as it is necessary to good farm yard management, that as soon as the dung collected during the winter season has been removed, that some sort of earthy materials should be deposited evenly over the bottom of the bason, for the liquid matters to operate upon, and bring into a state of manure, throwing upon them all the different substances that can be brought together in the course of the summer and autumn; by which means, from the bason being nearly filled up at these periods, the dung collected during the winter will be raised and supported out of the way of water, which is suggested by fome, to prevent the conversion of the different substances into manure. It is evident that suitable drains must be formed from the flacks of the different large animals, as well as from the pig-flies, and other buildings, where any fort of stock is fed and kept, to the hollow or bason, in order to convey the liquid matters; the mouth of the outlet channel being well secured from being choked up, by piling the dung up to a great height above it; a suitable well or pit being provided and kept ready for the reception of the super-abundant liquid to filtrate and discharge itself into. When the farm has land of the graves kind lying in a suitable manner below the level of the yard, on which the overflowings of such basons may discharge themselves, every part of the dung yard may have a sloping direction towards the receptacle. But, in other cases, it should not receive any more water than is supplied by the atmosphere, which may easily be effected by elevating the rim a few inches above the surrounding surface of the yard, which must be occasionally freed from the matters deposited upon it, by removing them into the bason. In these cafes the water falling on the surface of the yard should be conducted to a caph pool to deposit its useful materials, or to a drain made in a convenient manner for the purpose: and that falling upon the buildings be discharged, without passing through the bason; except there should be a greater want of liquid than solid nature.

From the very slow progress which yard manure is found
to make towards the proper state of maturation, in the open air, during the winter season, even when piled up in the dry weather. In consequence of this, and its being constantly saturated with moisture and exposed to a cool atmosphere, the plan of having the receptacle for the dung of a long square form, so as to be covered with a roof to wholly protect it from rain water, and defend it from cold, has been suggested, and long since strongly enforced by the Board of Agriculture. It is supposed that by thus giving it the means of passing into the state of fermentation during the winter months, its conversion into manure would be beneficially expedited for application to those crops which are put in in the spring. But it has not yet been fully shown whether the advantage would be adequate to the expense of such buildings, and the additional trouble of depositing and removing the manure. It deserves, however, to be observed that careful trials, although it is a method that cannot be safely advised for the common farmer.

It is a very material object to prevent, as much as possible, the waste of farm-yard manure, which takes place at present in most places; this may perhaps be the most effectually done by piling it up in the situation and manner which has been already noticed, and detaining the depots of the liquid parts in suitable receptacles, making collections of other proper matters where it can be done with propriety. It has been suggested that the having only a reservoir for farm-yard liquor is of vast consequence in these cases, even where there are no lands proper for letting the contents upon; particularly where it is provided from time to time, as noticed above, with suitable linings of good mould or other matters, for absorbing the sediment which is let fall from the liquor, when in this stagnant condition.

In a dry season, when the liquid part is wholly removed by evaporation, the rich muck thus left should be carried out and spread on the grassy lands which are under the yelthe, as soon as possible, after the crops have been removed from them. The benefit of a receiver of this sort, whether formed for carrying on irrigation, or for collecting the muddy sediment, will, it is supposed, be in proportion to its size, and the expense of making it in a given situation will be in a somewhat similar ratio; and will most likely pay in an ample manner for being made. For if one which collects ten pounds increase the annual produce of hay only one load, a tenant may, it is supposed, well afford to pay six pounds per cent. for the use of it. It is further stated, that on a sloping uneven surface, a reservoir of this kind may be formed at a very trifling cost in comparison to its utility. And the form or shape of it is considered as of no consequence, provided, when it is designed for irrigation, it be supplied with a valve, that when full, the water may be let off in a sufficient body to be distributed evenly, and with proper effect over the surface of the land.

All these points should be fully attended to in forming new farm-yards, in order that the greatest possible saving of manure may be made.

It has been justly remarked by a late writer on modern husbandry, that where the farm buildings are without order or connection with each other in the yards, as is too commonly the case in many parts of the kingdom, the dung is mostly thrown on flats of ground allotted for the purpose opposite to the doors of the stables, cow-houses, sheds, &c. where it is allowed carelessly to remain; its more valuable particles, in the mean while, being exhaled by the influence of the weather till the return of the season, when it is usually laid on the lands. If the houses happen to be situated on an eminence, the dung lying in small quantities is drained of all its moisture. If, on the other hand, they are placed in a hollow, the dung is for the most part allowed to remain fecked in water. In either case its quality must be greatly impaired, and its usefulness in promoting vegetation much less than when, by proper attention, all the effence is retained. The advantages resulting from well-constructed farm or foddering yards are, therefore, the writer conceives, various and important. By means of them the quantity of dung is much increased, and the quality rendered superior: for these reasons, he is of opinion, that the advantages of possessing proper accommodation for the cattle on the farm are more than sufficient to counterbalance the expense incurred in creating them. He feels himself warranted to state this opinion, not merely because it is his own, but because it is considered as well-founded by many intelligent farmers in both kingdoms, with whom he has conversed on the subject. The difference must indeed be obvious to every intelligent reader who is at all acquainted with these matters. Where proper houses and other accommodations are erected, the dung is collected into one mafs, the various forts carefully mixed together, and the superfluous water carried off by proper drains; by which means it retains its properties, and must consequently become useful, and its effects conspicuous, when applied for the purpose of invigorating the soil. Whereas, when the dung is allowed to remain in small, detached loose heaps, the most valuable parts are, either drained off or evaporated; so that what remains is comparatively of little value. Although it will be readily admitted, that an active and industrious farmer who labours under the inconvenience of having too few farm offices, and those improperly situated, may, by his superior attention, lay up as great a store of dung, of a good quality, as his less afflictive neighbour, who is better accommodated; yet, whoever makes this the subject of general investigation will find reason to be satisfied, that on all occasions where the proprietors, by liberal arrangements with their tenants, afford them the requisite accommodation for their horses and cattle, there the farm-yard dung is in general in greater abundance, and of a richer quality.

There has been considerable diversity of opinion concerning the form of a farm-yard, that affords the greatest convenience, some contending for the square, others for the circular, and not a few for the angular or many-sided form. It is evident, however, that the shape must constantly materially depend on the nature of the situation and other circumstances which are connected with it. The square form was that formerly most prevailing; but this has lately given way to those of the circular and many-sided forms, as affording a greater number of conveniences, and more room in the same extent of building.

The following two plans of farm-yards are of the square form, and have been found highly useful and convenient in actual practice. The first is taken from the author of the "Chester Agricultural Report," as having on the farm of Droom-fields, belonging to the Reverend John Warbier. The buildings are conducted on floor, which was obtained from a quarry in the vicinity, and the whole of them covered with slate. The general plan of all the various buildings and conveniences is shown at fig. 1. in Plan VI. on Agriculture. Here Mr. Beckett, the present occupier of the farm, has availed himself of the opportunity afforded him by a gentle current in the ground from the front of the house, to convey a small stream through the yard over the meadows below the buildings, by which an uncommon degree of verdure and luxuriance has been produced, which fully demonstrates the benefit which has been derived from the practice.

The latter is described in the "Farmer's Magazine," as being
ing constructed by David Hunter, Esq. at Eskmount, in the county of Forfar, in North Britain; and the plan of which is represented at fig. 2, in the same plate. In this A, A, are roll troughs for the fattening beasts to eat out of; being formed of hewn pavement, as well as the divisions which are arched below; by which contrivance they can all be rendered perfectly clean, by pouring water into the weftlenmoft, and making use of a bream as it is discharged at the contrary end. B B, is the groove or hollow behind the animals, which receives the dung and urine, and which left is discharged at the opening C, in the east wall into a wooden spout D, which is moveable at pleasure, so as to deposit it on any earthy material that may have been previously laid down for the purpose, by which means a great increase of manure is made for future use. E, E, E, are three small vents made in the north wall, for letting off the offal produced by the breathing of the cattle, by which the timber is greatly preferred, and the animals prevented from sweating too much or being too hot; their breath being lighter than the atmospheric air requires this sort of ventilation to expel it. F, a small door in the east corner, where there is a room and bed for a cattle man, that he may be at hand, in case of need. G, G, two doors to the southward, through which is an easy conveyance for the dung and dirty litter into the dung court, in which H, H, are sleds for containing your wintering flock. I, I, the shed for holding turnips or other roots, as well as the straw and hay that may be requisite. K, the door, which is sufficiently wide to back the carts in, and in which the roots are topped. L L, is a roomy dung-heap, for depositing earthy or other sub- stances, for receiving the discharge of the farm-yard, stables, and different stalls and sheds. M M, is a raised caufeway, which ranges all along the feeding stalls and west side of the dung court.

The great advantages of this construction of farm-yard and buildings are thole of keeping the cattle more clean, letting them have their food in a sweeter state; and thereby thriving better; and the prefering of a much larger proportion of the dung and urine of the animals. Besides, in this way there are other advantages in having the turnips or other roots brought from the field without wale, whilst they can be topped and the tops confined green; in their being laid in with left labour and trouble; and in the being no necessity for using them in a trampled and improper condition.

This is an excellent plan where the practice of stall-feeding cattle is to be carried on.

The two farm yards which are represented in Plate XVII. on Agriculture, are formed on the angular or many-sided, and the circular plans, and are calculated for farms of considerable extent, and under mixed cultivation. Fig. 1, is the representation of an useful one of the former description; and at fig. 2, is the delineation of one of the latter kind. They are either of them capable of being varied so as to suit particular intentions. See Farm Buildings, and Farm Houses.

Farm Yard Manure, is a term frequently applied to the manure which is raised and provided in the farm-yards. See Compost, Farm Yard Dung, and Manure.

Farm Yard Management, in Rural Economy, is that sort of management which relates to the business and operations of the farm-yard. In order to augment and procure as much manure as possible, the farm-yard should constantly be kept covered with some earthy material, on which the dung and urine of the cattle may act; and with which they may be combined, and thus increase the quantity of the manure heap. Good manure, peat earth, and the dippings of roads and ditches, are highly proper for the purpose. Where there is a pit or reservoir for the reception of the urine and other liquid matters from the yard, it may be formed as to serve two yards, and may be bottomed with broken clay, and its sides plastered with some composition which will make it retentive. Into it may be shot as much ditch earth or other substanées as it will properly hold, without causing an overflow; and, instead of pumping the liquor out in the end, as has been recommended, it is probably better to shoot in earth sufficient to wholly absorb it, afterwards carting the whole away to the compost-hill, which is believed to be the easier method of the two. Upon the bottom, in the yard, the layer of manure earth is to spread to the thickness of a foot, if possible, throughout the whole area, the quantity in the centre, or drain, being increased two or three fold, as having the greater part of the moisture to imbibe. The whole must be kept sufficiently littered, that the cattle may not poach in the earth with their feet. The above, or some method of similar effect, for the preservation of articles so precious to the farmer as the dung and urine of his cattle, one would suppose, a late writer says, so simple and obvious, that common sense could never miss it. How strange then is it, that we fee such beneficial measures generally neglected, and that by men who have it in their power to compass them, and who pretend to be sensible of the value of the manure? How many hundreds of farm-yards are there either mere holes, or with bottoms which absorb and devour the most valuable part of the manure, or with a deficient towards a pond, a road, or a ditch, where it runs off, to be in part or totally diffipated and lost? But what is still more singularly absurd is, that a pond or drain shall fortunately flop the greater part of this waste, and yet it shall be suffered to accumulate for years unobserved and untouched! This is by much too frequently the case.

With the view of promoting stall more the purpose mentioned above, from every flable or cattle-house, a drain, is observed, will be necessary, in order to conduct the urine to the proper receptacle; not a mere common gutter, in which the liquid runs and stagnates, keeping a constant puddle at the heels of the animals; there ought to be a grading, or bank-plate, to every two stalls at least, which, with the drain itself should always be kept free and pervious. The entrance to the chief cattle-house is usually over a pavement of convenient width. The dung from the different houses must, both for convenience and preservation sake, be flowed near at hand; for, should it be wheeled into the area, it would be trodden to wale, that is to say, either bound down too hard, or too much scattered, instead of which it may be at once placed in a flate proper for fermentation and putrefaction. Either slight pits may be made opposite to the
the stable door, and bottomed with mavel or earth, or the dung may be made up in clumps or hills; in both which cases the nice and scientific cultivator may, if he please, cover with straw or flubble, in order to prevent exhalation, and to promote the putrefactive process. The heaps growing to an inconvenient bulk, an auxiliary dung-hill must be pitched in the nearest situation; thus, in a certain, perhaps sufficient degree, with attention and a little ingenious contrivance, the dung may be preferred from exposure to the external air. In case of its too great aridity or drought, in the hot season, and with the view of re-producing fermentation, no method is better, the writer supposes, than to stir into the heap mud, weeds, flop of any kind, or foul water from ponds, ditches, and other similar places. Others, however, advise that the manure raised in the fold-yards should be wholly removed from them every fix or eight weeks, and thrown up into heaps, in order that fermentation may be more fully carried on, in consequence of the more free admission of air and moisture, as by suffering it to continue longer in such places it is liable, from the excessive treading of the cattle and other forts of live stock, to become so hard, in particular parts, as to prevent the regular process of conversion from going on; and in case of the seafon becoming dry for some length of time, to undergo decay in a partial manner only, which is very disadvantageous to the farmer. On this principle, therefore, the practice sometimes had recourse to, of turning over the manure in the farm-yards, in the vernal seafon, when the weather is dry, and the dung so compact and delitute of moisture as to require being cut and removed in large lumps, is evidently wrong, as by blending the dry parts with the more moist ones, the process of decay is greatly checked and retarded, and the forming of good manure prevented. The lighter and more evenly the heaps of the materials can be thrown together, the more quickly they take on heat, decay, and become good manure. And if the manure of several different forts of animals be blended together, such as that of hogs, neat cattle, and hofes, it is supposed, by forescurrency of much the better, the fermentation proceeding more rapidly.

It is considered by many a very improper practice to have this sort of manure, in a state ready for application, any great length of time before it is wanted, as was formerly much the case; as the most rich parts of it are continually going off by evaporation and solution, and of course the strength of the manure much lessened.

Where this sort of manure is to be formed from the roots of different kinds of weeds and other plants, and various coarse vegetable productions, a much greater length of time will be required to bring it into the condition of good manure, than would otherwise be the case. It has been the subject of dispute, the writer noticed above says, whether or not it be preferable, in point of interest, to keep cattle enough to consume all the straw as meat, without any being allowed for bedding: the affirmative, he thinks, not improbable; but it is a length in cattle feeding to which few will be disposed to proceed. But to go upon the supposition of foddering abroad, nothing can be more plain than the cow, when deprived to cattle from warm littering and flelter; and it is equally obvious, that young and growing flock thrive much better in the range of a yard, than when confined in a stall, being also much more agreeable to their natural liking. This idea extends to store-pigs, which are almost indispensable in a yard, as gleaners of what would be waste to every other description of animals. Some are for confining all cattle to the house throughout the winter, and even recommend the expense of entirely covering in the yard with a roof of deal boards, a greater premium, in his opinion, for the perfection of dung, than such perfection, if attained, would ever repay. In case of a very large flock, it would be to incur no flight risks of contagion. It would be to run into the extreme of the continental practice, where they exceedingly injure the health of their cattle by too close housing, filling heat, and hot wetly dopes. Theirs and our common system form, he thinks, two extremes. He has long also been decidedly of opinion, that sheep are equally entitled to the benefit of the home-fold with any other description of flock, and that they will repay it in an equal proportion: they must, however, be folded apart from the other cattle. By keeping yards properly formed for them, well littered down with straw or other suitable matters, and having them put into them during the night, will flows of excellent manure might be formed. Where deer are kept they might also be had recourse to in the same way with great benefit in the view of manure.

Great care and attention are requisite in the management of every kind of flock in the farm-yard, as well in respect to the proper foddering of them as the keeping of them clean. Each should be performed with great regularity and exactness. The farmer should himself if make frequent examinations, and see that all the different descriptions of flock go on in a proper manner, and that nothing is neglected by the servants who are employed in the yard business.

The present mode of managing farm-yard manure, previous to its being laid on the land, is flatted by a late writer to be in almost every part of the kingdom, where regular farm-buildings have not been erected, extremely negligent and improper, and such as calls loudly for reform. This will appear more especially necessary, he thinks, when we reflect on the small number of farms that are properly accommodated with farm-offices, compared with those that are deprived of necessary accommodations in this respect. We must, then, perceive that the evil, in regard to the management of farm-yard dung in Great Britain, is as extensive as it is serious. The lots of manure in this way must be prodigious all through the country. Reform has, however, begun to take place in most of the improved districts, and will, no doubt, be gradually introduced into the others, as the advantages of it become better understood. See Manure, and Farm-Yard.

Farms, Letting of, is the custom, practice, or business of getting, or providing them with such tenants as are proper and adequate to the cultivation and management of them. This is evidently a matter of great consequence to the proprietors, as their advantage depends materially upon both, in so far as their rents and the improvement of the lands are concerned. It of course behoves them to act with considerable attention in the adjusting of the business. There are several different methods of managing it, as by public auction, the highest bidder being the tenant; by ticket or written proposals, the highest offer having the farm; and by the asking of more rent than the farm is worth, for as close with the person promising the largest rent, without regarding his qualifications or fitness as a tenant. The two first methods are common, and generally for obtaining tenants for farms, where the owners or managers of them are not well acquainted with the value of the lands, or the qualifications of the tenants. And where the silly imprudent custom prevails on estates of letting the manager have a profit on leases or agreements for farms, this manner of letting them becomes still more agreeable, as it is three to one that either the farms are let too dear, or that the tenants are unequal to their management; consequently,
FAR
there is a fair prospect to the drawer of the leaves of their being to be re-let in the course of a very few years. Further, if he have not only a handsome profit upon every pair of leaves, but is allowed or accustomed to take less of entry, the prospects are still more bright and promising. And where, in addition to this, there is a further profit on decency of ditches and forrider, how can a person be blamed who has probably a large family to support, for letting farms by auction or by proposals; or for agreeing with an adventurer, or with any man as ignorant as himself of their real value, for more money than they are worth; or for screwing up the tenants in possesslon to rents they can never possibly pay; when he knows, perhaps, that by so doing he shall not only enhance his income, but gratify his employer. It is justly suggested that it is the employer not the agent, who, under this false principle of management, is playing the losing game! Excessive rents are only nominal. They look well on a rent-roll while they have a right to land there. But if the arrears of rent be received through the ditches and ruin of the tenant, the injury done to the estate, not to mention its loss of character, is to be deducted from the nominal rent. At length, when the lands are completely exhausted, the buildings let down, the gates and fences broken and destroyed, the water courses choked up, and the roads impassable, the tenant, says Mr. Marshall, runs off, and the farm lies unoccupied, a very blank in the rent-roll. Such, he contends, is the impropriety of this method of proceeding in the tenantry of the estates. To the life tenant of an estate, who has no interest whatever in the remainder, and whose life is worth but a few years' purchase, such a mode of proceeding might chime, he supposes, a sort of justification. But that, in the possesslon of a hereditary property, which is expected to descend to the son and son's son, such an improvident practice becomes, he says, altogether irrational. It might be deemed an act of folly in a young man; and of cruelty as well as folly in one of ripe years; whose successor might thereby be involved in perpetual difficulty; and his own memory in consequence be throved in disgrace. The writer, in his various examinations and investigations of the different departments of the kingdom, has seen much mischief and misery resulting from this provident and politic plan of management in the letting of farms.

It is strongly suggested, that if the intimate connection which subsists, which must subsist between owners and occupiers, be well considered, and how much the interest of the former depends upon the conduct of the latter, it is but common prudence to be ferupulously nice and attentive to the choice of tenants. And as in every situation there is at all times a fair rental value, or market price, of lands, as of their products, there appears to be only one rational and eventually profitable method of letting a farm, which is that by fixing the rent and choosing the tenant. As in this mode there is the greatest chance of securing proper tenants, especially in so far as the good cultivation of the land is concerned and the due payment of the rent.

FARMER, a term which signifies a person whose buffets is the cultivation and management of farm lands, and the several kinds of live stock necessarily connected with them, as well as the different products which are afforded from both. Farmers may be still further distinguished, according to the nature of the farms, and the forts of management under which they are conducted, into arable, grazing, dairying, and hay or grist farmers.

The farmers of this country may now probably be divided into two classes, the large and the small, which differ very materially in their habits and opinions. The views and notions of the latter are mostly narrow and confined, in consequence of the want of education, resulting from their situation in society, which does not permit them to improve themselves in any high degree. It is perhaps on this account that farmers of this fort are so backward in admitting any innovations on the methods of husbandry to which they have been accustomed; incapable of perceiving the benefits that might be derived from proposed alterations, they are too apt to adhere to the practices which they have received from their ancestors, and to transmit them unchanged to their posterity. Their habits having been formed to some particular system or practice, they continue to pursue it with a blind unvarying attachment.

On the contrary, the large farmers, having their minds more enlarged by education, are much more intelligent, and actuated by a more judicious and rational spirit of improvement. It is to the influence and exertion of this valuable class of farmers that most of the improvements which have lately been made in husbandry in this country are to be ascribed. They have likewise contributed in a very material degree to the extension and spread of that spirit of investigation and experiment which, while regulated by judgment, cannot fail of leading to the most important and useful results.

But a late writer on agriculture has arranged the farmers of this country under the following several classes or heads: 1st, the King; 2dly, the great proprietors and country gentlemen; 3dly, yeomen, and farmers properly so called; 4thly, poachers of small farms; 5thly, cottagers, including different descriptions of people who cultivate small farms, and a few acres adjoining towns and villages; and, 6thly, the unproductive clafs of husbandmen.

It is supposed that in regard to the first, it will not be denied that the governments of modern Europe have hitherto encouraged the towns in preference to that of the country; and in some measure depressed agriculture in order to advance manufacturing and commercial industry. While, on the other hand, the government of the immense territory of China encourages agriculture more than all the other arts; infomuch, that the condition of a farm labourer in that country is said to be superior to that of an artificer, as with us it is inferior. It is not believed difficult to trace these different systems of policy to the same source, however apparently inconsistent they are in themselves. The increase of commerce and manufactures in the different kingdoms of Europe has always been attended with an increase of revenue to the state, and which, in consequence of being brought more speedily, and with less expense into the exchequer, than that arising from agriculture, becomes thereby more advantageous; while the sovereigns of China derive the greatest part, if not the whole, of their revenue from the produce of the soil. From these opposite systems of political economy, another might, it is imagined, be established, infinitely better calculated to promote the interests of the nation, by affording the means of supporting a more numerous population than is possible to be done by adhering to either of the former. Were agriculture, manufactures, and commerce alike encouraged, they would all prosper in an equal degree; and though the revenues arising from the former might not be so well calculated to answer any sudden exigence, yet experience has proved, that, in this kingdom, they form the most sure and permanent resources of the state, as is evident from the land and malt taxes, excise on ale, beer, British spirits, cider, perry, leather, candles, and almost every other article produced in the country.
If this proposition be well founded (and it is presumably it will not be controverted), it must give the most sincere satisfaction to every lover of his country to see that the sovereignty of this great kingdom, which has risen to so high in fame among nations for the extent of its manufactures and commerce, has, like another Cato, turned his attention to the cultivation and improvement of his native soil, and thereby done more for the encouragement of agriculture than could probably have been effected by any other means. The example which his majesty thus holds out for the imitation of the higher classes of his subjects cannot, the writer thinks, fail to be attended with consequences highly beneficial, as has been eminently testified by the meritorious exertions of his grace the duke of Bedford and many others; while the attention of the other branches of the legislature will naturally be turned to the formation of such laws and regulations in favour of those who practice this most useful art, as will in all probability tend in a very great degree to the further improvement of the country.

It is flated, that on his majesty's farm, and under his personal attention, farm-houses have been built, fivamps and morasses drained, plantations formed, and every means adopted that could contribute to improve the soil or embellish the landscape. In carrying on these works, liberal expenditure has been combined with minute savings, which is indispensably necessary in all the operations of husbandry, either where the object is profit, or, as in this case, a desire to promote the public good, by endeavouring to create a spirit in others for undertaking improvements of a similar nature.

In considering the second clafs, the writer remarks, that a considerable portion of the cultivated lands in Britain is possessed by the great proprietors, and such as generally reside on their estates, who may therefore very probably be denominated country-gentlemen. Exclusive of their domains, or lands around their manor-houses, these proprietors commonly hold farms, which are kept under regular modes of cultivation. Many of these characters merit high commendation for their steady and unweaned attention to that great source of national wealth, the improvement of better systems of husbandry; while others have gone farther, and not only endeavoured, both by precept and example, to induce their tenants to adopt such systems as they from experience had found beneficial, but also granted leaves of such duration, and on terms so liberal, as induced men possessing knowledge, enterprise, and capital, to apply them to the art of husbandry. It is to be regretted, however, that this cannot be said of all the great proprietors and country-gentlemen of this island. Many there are who, with a cool indifference respecting either the improvement of the country or the situation of their tenants, seem to think the chief business of a landlord ought to be an unremitting attention to the extension of his rent-rolls, without ever duly considering, that if additional rents are demanded, means should be furnished by the introduction of better systems of husbandry, improved breeds of live-stock, and the expenditure of money in the improvement of the property, by which tenants may be enabled to discharge such farther obligations. But from the spirit of improvement which has of late evinced itself so copiously, it may be hoped, that in a little time no instance of this kind will be found amongst this highly respectable clafs of farmers and proprietors of land.

Regarding the third clafs, or the yeomen and farmers, properly so denominated, they may be considered the strength of theflate. The yeoman and the farmer here alluded to differ only in one particular: the lands which the former cultivate are either in part or in whole his own property, while the latter rents his farm from another. In regard to industry, perseverance, and attention to business, there is no difference. Happy in their situation, removed on the one hand from the vauries and superfluities of high life, and, on the other, by their honest industry from the fear of poverty, the improvement of their farms constituting their chief study and delight, they spend their days in independence, enjoying health and all the rational comforts of life. It is suppos'd probable that near three-fourths of this kingdom are possessed by people of this description. Fortunate it is for Britain that this is the case; for although many of the proprietors are entitled to much praise for introducing improvements into various parts of the country, it is to this clafs that the nation is indebted for the improvements having become so general and extensive as they now are.

Concerning the fourth clafs it may be stated, that in all the best cultivated parts of Great Britain, as well as where improvements have not become general, there are many small farms. These, though not as yet in every case managed in such a manner as to produce the greatest crops which the soil is capable of yielding, are, however, much better cultivated than they were 30 or 40 years ago; and the spirit for improvements among tenants of this description appears to be more general than at any former period, although, from the want of capital, and the little attention generally paid to them by their landlords, added to their own attachment to ancient prejudices, they are yet very far from having attained that degree of usefulness, in an agricultural view, to which, by adopting proper means, they may be advanced. The poilcifiers of small farms are, however, very useful and valuable members of the community; honest, peaceable, and industrious, they breed up their children in the same principles, and to these are the manufacturers of our island most indebted for a never-failing supply of virtuous and useful artificers and labourers in various ways.

The fifth clafs, or cottagers, are those who either reside in the neighbourhood of large farms adjoining to moors or commons, or in small hamlets. They generally possess a few acres of tillage-lands, from the cultivation of which, together with what they receive for labour performed to the farmers, or from carrying on the occupations to which they had been bred, as weavers, tailors, shoemakers, blacksmiths, thatchers, &c. they are enabled to maintain their families, and to be of great service in the business of cultivation. Being for the most part industrious and inured to labour, they bring up their children not only without being a burden on the public, but to form a manly and virtuous people, extremely useful as members of society. These hamlets and cottages are also nurseries where the British farmer draws his constant supply of labourers for performing his work.

In regard to those who cultivate small farms, adjoining to towns or villages, they fall to be described under two characters. The first are such as reside in towns, and are engaged in commerce and manufactures; but who, for their amelioration, or the convenience of their families, possess small farms in the neighbourhood. These may be denominated good farmers only in a rational point of view. Their farms are indeed in some cases well cultivated, the crops luxuriant, and a full proportion, corresponding to the extent of the farms, comes to market; but, owing to their time and attention being occupied with other matters, in the faculties of which they are more immediately interested, few of them derive much benefit from their farming operations. The reason is obvious; there is no business requires more unremitting care than that of husbandry; and, though people
people so employed may have it in their power to pay attention to the great leading points, as that of seed-time and harvest; it is not to be supposed they can spare time to superintend the execution of many of those more minute operations, on the proper conduct of which the profits of a farm, particularly one so situated, principally depend. The second are those who reside in or immediately adjoining to towns, and farm so many acres as enable them to keep a few milk-cows, or two or three horses to hire, either for the piddle or the cart. It is only necessary to say, that as, on account of local situation, they contain a very high rate of rent, and very few hands, they therefore find it for their interest to cultivate them in the best manner, so as to induce the greatest possible crops. The uses to which these crops are applied, it will be readily admitted, tend in a material degree to the convenience and accommodation of the inhabitants, and therefore cultivators of this description are to the inhabitants of these towns and villages what the British farmers are to the nation at large; namely, the means by which they are furnished with many of the necessary and comforts of life. Without the aid of this industrious class of men, it is evident that manufactures cannot flourish, as those engaged in them in the various towns would be obliged to disperse, and seek their supplies in the country, without which their situation would be in a great measure unsupportable.

While touting up this account of the cultivators of the British soil, there yet remains a very numerous class to be taken notice of; and it is to be regretted, that the appealation of the unproductive class but too well applies to them. Those are, the great body of the inhabitants in the remote parts of Scotland, who are without doubt the most useless inhabitants in the island. This, however, it is but justice to say, does not arise from any fault of theirs, but from the negligence of those who should be their natural guardians and protectors. They are well known to be capable of the most indefatigable exertion and perseverance, when taught to look forward to any object, either of glory or of interest. But they are permitted to waste their time in sloth and idleness. Were the landholders to bestow the proper attention, which an object of such national importance merits, those people might, in a few years, be taught the first principles of improvement; namely, the value of time, and the beneficial effects of labour. Then, but not till then, will a knowledge of agriculture and other useful arts prevail amongst them, and take the place of that gloomy melancholy which was introduced under the feudal system, and has long held its reign. The greatest part of the cultivated lands in the highlands and islands of Scotland is possessed in townships; that is, a number of tenants reside in the same town or hamlet, and own small lots adjoining. In almost every such case the modes of cultivation, and the implements of husbandry, are probably little improved from what they were five hundred years ago, at least they are wretched in the extreme, the culture of potatoes being the only improvement of any consequence that has taken place for ages. When to this it is added that few attempts have been hitherto made to introduce either commerce or manufactures, it will appear evident to every British reader, that this great body of his fellow-subjects may, with too much propriety, be termed an unproductive class, and in their present situation be considered as a burden, rather than an advantage to the state. There are notwithstanding many in those districts who, from the extent of land which they possess, their knowledge of agriculture, and the attention which they bestow on the improvement of the different species of live stock, are justly entitled to be ranked among the number of British farmers; and if proper encouragement was given by the proprietors, and such modes of improvement introduced as the country is most susceptible of, that number would, it is supposed, naturally increase in a high degree.

It is of much consequence to farmers in general, that they consider the nature of their different situations with attention, as by such means they may introduce the most advantageous systems of management on their farms. They should likewise be particularly attentive to the raising of various sorts of feed, as well as to the practice of cropping; and above all to the keeping of regular accounts. See Farm.

Farmer, in Law, he that tenants a farm, or lease thereof. Also generally every lessor for life, years, or at will, is called farmer. Farm, or seigne, being an old Saxon word, signifying provisions. (See Farm), came to be used instead of rent or renders, because anciently rents, or the greater part of them, were reserved in provisions, in corn, poultry, or the like, till the use of money became more frequent. Hence a farmer, fermarius, was one who held his lands upon payment of a rent or seigne; though at present, by a gradual departure from the original sense, the word farm is brought to signify the very estate or hands to held upon farm or rent. See Lease.

As this word implies no mystery, except it be that of husbandry, husbandman is the proper addition for a farmer.

Farmer, Hugh, in Bishops, an eminent divine among the Protestant dissenters, not less distinguished by his popular talents as a preacher, than by his learning as a theologian, was a descendant from respectable ancestors in North Wales, and born at Shrewsbury in the year 1714. Having laid a suitable foundation of classical literature at a school near Towyn, in Merionethshire, and afterwards under the tuition of Dr. Charles Owen, a learned dissenting minister at Warrington, in Lancashire, he was initiated as a student for the ministry, in the year 1730, at the academy in Northampton, and then under the superintendence of Mr. (afterwards Dr.) Dodridge. After he had finished his course of studies, very much to his own honour, and to the satisfaction of his tutor, he settled at Walthamstow near London, as chaplain to William Coward, Esq. and also as minister to the dissenting congregation in that village. Mr. Coward, although he made liberal provision by benefactions and bequests for the education and relief of Protestant dissenting ministers, was a man of a peculiar temper, which obliged his chaplain suddenly to remove, and to take up an asylum in the house of William Snell, Esq. an eminent solicitor of distinguished probity and worth. Here he was hospitably received, and in this family he continued, on terms of the closest intimacy and friendship, for more than 30 years. The congregation at Walthamstow flourished under his pastoral care, and became one of the most considerable, as to the number and opulence of its members, in the vicinity of the metropolis. Mr. Farmer, whilst he regularly discharged the duties of his pastoral office, devoted himself to those studies, that contributed to the high reputation which he afterwards acquired in the department of Biblical literature. The first publication of this kind, which attracted notice, appeared in 1761, under the title of "An Enquiry into the Nature and Design of our Lord's temptation in the Wilderness," 8vo. The subsequent editions of this tract in 1765, and in 1776, afforded to the author an opportunity of establishing his peculiar opinions concerning the nature and design of this event, and of replying to his opponents. For
For an account of his sentiments on the subject, we refer to the article Temptation.

In the year 1771, Mr. Farmer published his larger and more valuable work, entitled "A Discourse on Miracles, designed to shew that they are arguments of a divine interposition, and absolute Proofs of the Miffion and Doctrine of a Prophet," Svo. This work, the subject and arguments of which will be more particularly detailed under the head of Miracles, is entitled, as one of his biographers says, "to pre-eminently diffucent for extent of inquiry, profusness of erudition, mannerly criticism, accurate discrimination, and perspicuity and fairness of reasoning." By all "refuting those principles of demonism, which have done so much disservice to the argument drawn from miracles in favour of the Jewish andChristian revelations," and by establishing the belief "that the world is under the government of God alone, and that no created spirit, much less such as oppose his will and benevolent design, can disturb that course and order of things which he has established," it leads to the proof of what is announced in the title, in a manner that will ever rank it, in the opinion of competent judges, among the most important productions in the cause of sacred literature. A charge of plagiarism having been unjustly alleged against the author, in consequence of this "Discourse," he took occasion to publish, in the year 1772, "An Examination of the Rev. Mr. Le Moine's Treatise on Miracles," in which he evinces the contrariety of Mr. Le Moine's opinion to the sentiments which he had advanced, and farther confirms them. Mr. Farmer's next publication appeared in the year 1775, under the title of "An Essay on the Demoniacs of the New Testament." In this treatise he pursues the reasoning adopted in his "Discourse on Miracles," and distinguishes himself as the advocate of an hypothesis, which had been previously adopted and supported by Mr. Joseph Mede, Dr. Sykes, Dr. Macd., and Dr. Lardner. It is hardly necessary to mention in this place, that these writers have attempted to shew that the disorders imputed to supernatural possessions proceed from natural causes, and not from the agency of evil spirits. (See the articles Demon, Demoniac, and Demoniacal Possession, and Demonomania.) Mr. Farmer's publication led to a fresh discussion of this interesting subject; and drew upon him the attacks of Dr. Worthington, a learned clergyman of the church of England, and of Mr. Fell, an acute writer, and a Protestant dissenting minister. To the former opponent Mr. Farmer thought proper to reply in a series of "Letters," &c. published in 1778; but to the latter, whom our author has, perhaps too freely, cenured for want of candour, he addresed no direct answer. However, Mr. Fell's work produced an elaborate treatise, which appeared in 1783, under the title of "The General Prevalence of the Worship of Human Spirits in the Ancient Heathen Nations, ascertained and proved," Svo. (See Demon.) In this treatise the author has incidentally introduced several strictures on Mr. Fell's performance, and some reflections, which have been thought, particularly by that gentleman's friends and the advocates of his opinion, too acrimonious and contemptuous. In this controversy, which was again pursued by Mr. Fell in the year 1785, candid perfons, whatever may be their peculiar sentiments with respect to the subject in dispute, have regretted that they have been able to discover too great a degree of personality, and of invective that goes beyond the bounds of the "retort courteous." Mr. Farmer declined any further reply, and refunded the prosecution of those general inquiries, in which he excelled; and from which the literary world might have derived further advantage, if his health had continued, and if he had not enjoin-ed on his executors the unpleasant charge of committing all his sermons and manuscripts to the flames. Among the latter was "A Discourse on the Story of Balaam," which had been transcribed for the press, and a collection of papers, prepared for an improved edition of his Treatise on Miracles.

Having remained sole minister of the congregation at Walthamstow for several years, he was provided with an ingenious and able associate, the Rev. Mr. Ebenezer Radelife; and, in 1761, he accepted the office of afternoon preacher to the respectable society at Salters' Hall, in the city of London, where for several years he exercised his ministry to a numerous auditory. He was also soon after elected one of the Tuesday lecturers at the above-mentioned place, a truthe of Dr. Williams's charities, and one of the trustees of Mr. Coward's bequests. But as he advanced in years, he found it necessary to discontinue his public services; not without the regret of the societies with which he was connected. In the year 1785, the close of his life was embittered by a total failure of health; for which, however, he obtained relief by a surgical operation, to such a degree as to enable him to pursue his favourite studies. But his infirmities gradually increased; and in 1787 he terminated his course of honourable labours, having attained the 73d year of his age. "Of Mr. Farmer's character as a scholar," says one of his biographers, "his learned labours afford sufficient testimony. As a preacher, he was distinguished by a happy variety of thought and expression, judicious criticism, liberality of sentiment, and energy and eloquence of language. His voice was uncommonly clear and harmonious, and his manner of delivery natural, manly, and impressive. He was a man of ardent but cheerful piety, who recommended the religion he taught by the exemplariness of his moral conduct, and adorned it by his benevolence and candour. In conversation he was lively, and often brilliant; and in his manner polite and complimentary, sometimes to excess. On disputable topics, it was no easy matter to draw from him a decided opinion. Upon the whole, Mr. Farmer is entitled to a high rank among the differing ministers of his time, and supported an honourable station in the literature of the age." Biog. Brit. Gen. Biog.

Farmer, Richard, D. D. a celebrated scholar and critic, was the son of a hatter at Leicesters, where he was born in 1735. He received the elementary parts of his education at his native town, whence he removed to Cambridge, and was entered a pensioner of Emmanuel College; here he took his degrees, and, in 1762, was appointed classical tutor of his college. In 1767, he became one of the preachers at Whitehall. In London he refuted very much with Dr. Aikin, a physician, well known for his curiosities and very valuable library, of which Mr. Farmer did not fail to make a good use. He had already engaged in a course of reading which laid the foundation of a work to which he was indebted for the principal part of his literary reputation. This was entitled "An Essay on the Learning of Shakspeare," first published in 1766. In this essay, Mr. Farmer undertook to shew that, in the time of our great poet, English translations existed of most of the classical writers, and by tracing even the expressions and mistakes of the translators in those passages of his plays which allude to the subjects treated of by these writers, he proved that the untutored Shakspeare had read the translations instead of the originals. The essay, which went through several editions, was printed in the edition of Shakspeare, by Stevens and Reed, in 1793. The notice Mr. Farmer acquired by his performance was the
the means of his advancement in the church, and he obtained the chancellorship and prebendal stall in the cathedral of Litchfield; and, in 1775, he was chosen master of Emmanuel college, on which occasion he took his degree of D. D. He was afterwards made principal librarian to the university, and served in his turn the office of vice-chancellor. Being a zealous advocate for the existing order of things, and attached to the church in its present state, he was fierce in his opposition. Lord North conferred upon him a benefice of Camberbury, and he was twice offered a bishopric by the late Mr. Pitt, but he preferred a presidencship of St. Paul's, which he exchanged for his prebend. He was now obliged to reside three months in the year in the metropolis, which he spent very agreeably in the society of his friends, and among the first literary characters, to whose esteem his own learning and acquirements gave him high claims. He was hostile to certain academical reforms which were proposed in his time, but was the chief promoter of improvements in the policy of Cambridge, particularly those of paving and lighting the streets, and it was in great measure owing to his exertions that the cathedral of St. Paul's was permitted to receive those decorations of monumental sculpture which, while they exhibit high merit and national gratitude, will gradually cloth and highly adorn the present nakedness of the edifice. Dr. Farmer died in September, 1797, at Emmanuel college, and to his memory an epitaph was inscribed on a tomb by Dr. Parr. He published nothing but the essays referred to, though, while young, he issued proposals for a history of Leicestershire; for this he collected only a few materials, which were afterwards put into the hands of Mr. John Nichols. Necrology.

Farmer, John, an English madrigalist of some merit, but not so much as he imagined. In 1599, he published his first set of English madrigals, to four voices, professing in his preface to have "fully linked his muse to number," as each gives to other their true effect, which is to move delight; a virtue," he adds, "to singular in the Italians, as under that ensign only they hazard their honour." This boast made us examine his accentuation of the words of his madrigals, with some expectation of finding greater accuracy in that particular than was general at the time; but, on the contrary, his affection is so far from true, that there appears more false accent in his fongs, than in those of his contemporaries.

Farmery, in Agriculture, the site or place where the farm buildings are erected, and the general business of the farm principally carried on; the same being house and home. It is a matter of much importance to have it conveniently placed for performing the work of the farm. Farming, signifies the art of managing, or general detail of the business of a farm. It is an employment of considerable difficulty and trouble, as requiring constant care, united with great activity and judgment. In order to conduct it with propriety and advantage, it demands an intimate practical knowledge of the various arts of cultivation and management which are in use, as well as the nature and value of every description of live stock; likewise a perfect acquaintance with the various methods of buying and selling, and the constant state of different markets and fairs. And, besides these, there are other minutiae which are of equal importance to the success of the farmer. The advantages of farming differ materially according to the nature, situation, and circumstances of farms, as well as the care and management that are bestowed upon them. It is stated by the writer of the "Survey of the County of Middlesex," that the profits of farming, under the old course of two crops of corn and a fallow, have seldom afforded more than a mere subsistence to the farmer, and the means of establishing his children to run the same course. But even this, he contends, is no proof against the profits of farming per cent., on the capital employed, which is generally to small a sum, that the foregoing produce may be a large per centage, and with sedulous attention this has been the fact; as from the accounts of particular families which he has examined, a profit of thirty-two per cent., per annum on the farm made use of has been demonstrated for thirty-five years in succession. Indeed it seems to be evident that a person who employs only 500l. and with it brings up a large family, and places them in a situation equal to his own, while himself retires with an easy fortune, could not have done it with a left return. But the great improvements which have for some time past been taking place in agriculture, aided by high prices for the produce of the soil, are occasioning such a rapid rise in rents; the taxes also, and every expenditure are greatly on the increase, as must, he supposes, at the lowering of the price of corn and cattle, put farmers of the old school to considerable difficulties, and become one of the means of inducing them to adopt the new and better practice. Changes in this way, however, except under particular circumstances, are very slow in their progress.

The profits of arable farming are, in general, tolerably well understood; therefore they need not be introduced here.

The following is a statement of the produce and expense of 150 acres of good grassland, at the distance of eight miles from the London market.

<table>
<thead>
<tr>
<th>Description</th>
<th>Acres</th>
<th>Load</th>
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<tbody>
<tr>
<td>Hedge rows, and waste of farm</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Mowing ground</td>
<td>130</td>
<td></td>
</tr>
<tr>
<td>Produce at one cutting for hay</td>
<td>100</td>
<td></td>
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<tr>
<td>Average sale of ditto for five or six years</td>
<td>£1,300</td>
<td></td>
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<tr>
<td>After-feed fold for</td>
<td>65</td>
<td></td>
</tr>
<tr>
<td>Total produce per annum</td>
<td>£1,365</td>
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<thead>
<tr>
<th>Description</th>
<th>Expenses</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Four horses 36l. each</td>
<td>£140 0</td>
<td></td>
</tr>
<tr>
<td>Three men all the year, at 12s. per week</td>
<td>93 0</td>
<td></td>
</tr>
<tr>
<td>Extra labour, of mowing, hay-making,</td>
<td>97 10</td>
<td></td>
</tr>
<tr>
<td>Flecking, straw, thatching, and pulling, at 15s.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Taxes, arrears, and tithes</td>
<td>130 0</td>
<td></td>
</tr>
<tr>
<td>Marketing 250 loads of hay, at 42s.</td>
<td>52 0</td>
<td></td>
</tr>
<tr>
<td>Paid for 300 loads of manure, at 2s. 6d.</td>
<td>37 10</td>
<td></td>
</tr>
<tr>
<td>Tenants' repairs of buildings</td>
<td>10 0</td>
<td></td>
</tr>
<tr>
<td>Inheritance of stock, and tax on</td>
<td>10 0</td>
<td></td>
</tr>
<tr>
<td>Pilfering</td>
<td>10 0</td>
<td></td>
</tr>
<tr>
<td>Frauds of hay-salemen</td>
<td>10 0</td>
<td></td>
</tr>
<tr>
<td>Mole-catcher</td>
<td>1 0</td>
<td></td>
</tr>
<tr>
<td>Interest of 700l. for one year</td>
<td>35 0</td>
<td></td>
</tr>
<tr>
<td>Total expenses</td>
<td>620</td>
<td></td>
</tr>
<tr>
<td>Remains for rent and attention</td>
<td>745</td>
<td></td>
</tr>
</tbody>
</table>

which is equivalent to 5l. the acre.

Suppose the farmer to pay 3l. the acre rent, it will leave 2l.
FARMINGTON, in Geography, a large and flourishing township of excellent land in Kennebec county, in the state of Maine, North America, situated on Sandy river, which, in the S.E. part, has falls, that furnish good mills, for saw-mills, carding machine, grist-mill, and fulling-mill, already erected. It has a post-office, and contains 942 inhabitants; 204 miles N.N.E. of Boston.—Also, a large, pleasant, and wealthy post-town in Hartford county, Connecticut; 10 miles S.W. of Hartford city. This town is beautified and enriched by a river of the same name. In the compact part of the town, the houses stand chiefly in a street which runs N. and S. along the gentle declivity of a hill, and about the centre of the street is a large and handsome congregational church. This town was settled in 1645, and has 2809 inhabitants.—Also, a river of Connecticut, which rises in the state of Massachusetts, and runs south-ward through Hartford, Bark-Hempstead, and New Hartford. On the borders of Hartford county it receives a western branch, which rises from several pools in Colbrook, and continuing this course to Farmington, it meets with mountains and turns northerly, seeking a passage to the Connecticut. After running 15 miles, it unites with Salmon river, and running through the mountains and down a cataract of 150 feet, is afterwards called Windor river, and in a S.E. course mingleth with Connecticut river, 4 miles above Hartford.

FARMSTEAD, in Agriculture, the place or situation where the farm offices are built, and the chief work of the farm conducted. It is of much consequence to have it situated as centrally as possible in the farm.

FARMVILLE, in Geography, a small post-town of America, in Prince Edward county, Virginia, situated on Appomattox river, 210 miles from Washington. The river is navigable by boats from hence to Peterburgh.

FARNSWORTH, in India, two groups of small islands and rocks, amounting to 17 in number, and situated in the German sea, near the English coast, opposite to Bamborough castle, in Northumberland. They have all their respective names, and produce help, feathers, and eggs of fowls, and fowls: some of them bear a little grafs, and feed a cow or two. The principal, called "Farn," is about a mile in compass, and has a fort, and a light-house, which being never furnished with fire is of no use. N. lat. 55° 29'. W. long. 1° 41'.

FARNABY, Thomas, in Biography, son of a carpenter in London, was born about the year 1575. Having a turn for learning he was well grounded in the elements of grammar, and laid a good foundation in ethical knowledge. In 1590 he was admitted a scholar of Merton college, Oxford, but he soon quitted that university, and went to Spain, where he studied in a college of the Jesuits. With this situation he was dissatisfied, returned, and entered on board the fleet of Drake and Hawkins in their expedition of 1595. After this he served in the Low Countries as a soldier, and having led an unsettled life for some years, he landed in Cornwall, so much depressed with poverty, that he was under the necessity of teaching children their letters for a very scanty subsistence. He next taught a grammar school at Martock in Somersetshire, and from thence he removed to London, and opened a seminary near Cripplegate, where he attained to so high a reputation, that he is said to have had sometimes as many as three hundred scholars at a time. He now sustained a considerable rank in the literary world, by his editions of Juvenal and Persius; of the tragedies of Seneca, of Martial's Epigrams, and of Lucan's Pharsalia, and took his degree of M. A. at Cambridge in 1616.

At this period he sought for a more retired residence, and removed to Seven-Oaks, in Kent, where he contrived to take boarders. His profession was prosperous, and he became sufficiently rich to purchase some considerable estates in Kent and in Sussex. In the neighbourhood of Seven-Oaks it is prefixed the descendants of this industrious and learned man lived till within these few years, when Sir Charles Farnaby, if we mistake not, removed to another part of Kent, or to the borders of Surrey. At the commencement of the civil wars, Mr. Farnaby incurred the suspicion of being concerned in an insurrection at Tunbridge in favour of the king. This suspicion caused him to be imprisoned in Newgate; he had a narrow escape from being banished to America, and was, after his release from Newgate, confined at Ely House. He died at Seven-Oaks in 1647, aged 72; highly respected as a benefactor to early classical education. Besides the works already mentioned, he published notes on Virgil, Ovid, and Terence; and many small pieces for schools. He drew up also, among other things, a "Syllenian Grammaticum," by order of King Charles, who intended to substitute a new Latin grammar for that taught in schools. Biog. Brit.

FARNABY, Giles, a great organ-player and able composer, was organist of Chirilt oxford, and in 1592 attended bachelor of music. There are extant of his composition "Canzonets to four voices, with a string of eight parts," London, 1598. He assisted Ravencroft in setting parts to some of the psalm-tunes, published at the beginning of the next century. There are near twenty leffons in queen Elizabeth's virginol book, by Giles Farnaby, little less difficult than those of Bird and Bull. These great musicians, the wonder and delight of their times, seem to have had no conception of brilliancy or embellishment, but what arose from breaking common chords into arpeggio, or rapidly running up and down the scale in notes tied three, and often four times. They seem, however, to have been the greatest players in Europe, till Frescobaldi introduced a superior style of treating the organ, diversified of rapid and frivolous divisions, which disgrace that most noble and comprehensive of all instruments.

At present, the pieces of Bird, Bull, and Farnaby, muft doubtless appear dry and monotonous, for want of air, variety of movement, and modulation; yet before these qualities were cultivated, expected, or indeed existing, they fed the ear with pure and simple harmony, in a manner which none but keyd-instruments could effect; and perhaps their favour with professional musicians was not a little augmented, by the learning of their contexture, and difficulty of execution. For however the old masters may be celebrated for their finickity and scarcity of style, and the moderns indifferently contrived for multiplied notes, rapidity of performance, tricks, whip-fiddlebus, froth, tumbling, and mere difficulties; it would not be very easy to find, among the most complicated pieces of modern times, difficulties equally impassable with those in which these old fancies and variations abounded. Farnaby was of Truro, in Cornwall, and nearly related to Thomas Farnaby, the famous school-master in Kent.

FARNBACH, in Geography, a town of Germany, in the county of Hemeberg; 6 miles E.S.E. of Salzungen.

FARNESE, Alexander, in Biography, duke of Parma, son of Octavio Farneze, duke of Parma, and of Margaret
Margaret of Austria, born in 1546. He was educated in the court of King Philip II, and early embraced the profession of arms, and was present in his eighteenth year at the battle of Lepanto. From this period he interested himself in every thing that concerned the army; rejected all indulgences to which his rank might have laid claim, and was clad more like a soldier than a prince. He distinguished himself in the Low Countries during the administration of Don John of Austria, and upon his death, in 1578, was appointed to succeed him. He now carried on his military projects with great success, obliged Maastricht to surrender, recovered most of the towns in Brabant and Flanders, and laid siege to Antwerp. This last town afforded him an opportunity for the display of all his skill; at length he shot up the Scheldt by a vast bridge, and having an enterprise which occupied him nearly a year, during which he took Brussels, Ghent, and other places, and then entered Antwerp in a most triumphal manner in 1585. He granted favourable terms to the town, and completed his conquest of the Low Countries, which have ever since, till the late war, remained under the Spanish or Austrian sovereignty. He now extended his views to the Dutch provinces, openly sided by Queen Elizabeth of England; and to carry his point he took the command of the army, under the title of duke of Parma, his father being dead, defined to the conquest of England. The defeaters of the grand Armada rendered the design abortive. After this he made an attempt upon Bergen-op-Zoom. but was again foiled. Incendia tools and exposure to an unhealthy climate had undermined a naturally strong constitution, and some serious symptoms of drooping began to appear in him; but he was too important a character to be allowed the repose which the nature of the case required.

In 1590 he was obliged to march to France in consequence of the league which Philip II. was determined to support in its resistance to Henry IV. The duke performed all that was hoped for, and raised the siege of Paris, in which he displayed his military skill. Henry was so much hurt at the conduct of the duke, that he sent him a challenge, to which he replied, "that he was accustomed to fight at his own pleasure, and not at that of his adversary, and that he should not think an engagement when he found such a measure expedient." Two years afterwards he was again opposed to Henry, and again victorious. This was at Rouen, which was besieged by the king of France, but being relieved by the duke, he immediately advanced to the siege of Caudebec, where he was wounded in the arm. The king now pressed closely upon the duke, and reduced him to great straits for want of provision. Henry anticipated the surrender of the whole army, when the duke, by unexpected crossing the Seine in his rear, escaped the difficulty, and led back his troops safely to Flanders. This retreat excited the admiration of all military men, and sealed the reputation of its conductor. The duke was at this period in extreme ill health, and demanded a audience, but the king his master with much inhumanity refused to listen to his requiting, and sent him new orders: but death, a still greater tyrant than Philip, stopped his career in December 1592. A statue of bronze was erected to his memory at Rome. Moreni.

FARNHAM, in Geography, a town in the hundred of Farnham and county of Surrey, England, is situated partly on a hill which rises from the river Wye. A castle was built here by Henry, bishop of Winchester, brother to king Stephen; and since that period has continued to belong to the bishop of that see. At different times the building has been injured by sieges. During the civil wars, in the time of king Charles I. it was nearly demolished; being garrisoned for the monarch, it was invested by the parlia-

mentary forces, who, after a long conflict, obtained possession, and blew up and destroyed most of the walls and towers. Soon after the restoration, bishop Massey repaired the greater part of the fortresses, and fixed his residence within its walls; and since that period it has been rendered a handsome, commodious residence. The keep is called Jay's tower, the ascent to which is by 43 stone steps. The area at the summit is now occupied as a kitchen-garden.

The town of Farnham is paved and lighted, and having several good houses, has a respectable appearance. It contains 437 houses, which are occupied by 2508 inhabitants. The civic government of the place is vested in 12 burgesses, who act under the bishop. In the reign of Edward II. it sent members to parliament. In the vicinity of the town is More-park, which formerly belonged to sir William Temple. Here is a curious cave, called Mother Ludlam's Hole, through which passes a continual stream of fine water. This grotto is formed and decorated by rocks, marble, troughs, &c. Near this park was Waverley abbey, some few fragments of which only now remain. Farnham is noted for its large market for oats, between Michaelmas and Christmas; for wheat about Midsummer; and for hops. Many plantations of the latter are in the vicinity of the town; indeed, the Farnham hops have long been celebrated in the annals of commerce. Here are three fairs annually.

FARNHAM, a small town of America, in Richmond county, Virginia; 159 miles from Washington. Farni, a town of Africa, in Bambara. N. lat. 13° 40'. W. long. 4° 8'.

FARNO, or Farnia Iterum, a name by which some authors have called the bitter oak; the cerasus aegyptiaca, and appsia of other writers.

FARNOVIANS, in Ecclesiastical History, a sect of Socinians, so called from Stanilbuis Farnovius, or Farnobius, who separated from the other Unitarians in the year 1568, and was followed by several persons eminent for their learning and rank. This sect did not last long; for having lost their chief, who died in 1615, it was scattered abroad and reduced to nothing. Farnovius was engaged by Genuarius to prefer the Arian faith to that of the Socinians, and consequently affected that Christ had been produced out of nothing by the Supreme Being before the creation of this terrestrial globe. His sentiments concerning the Holy Ghost are not certain known; however, it appears that he warned his disciples against paying the tribute of religious worship to that Divine Spirit.

FARO, in Geography, an island of Sweden, about 30 miles in circumference, separated from the N.E. part of the island of Gotland by a narrow channel. This island is populous and fertile. The principal town of the same name is situated on the S.E. coast. N. lat. 57° 50'. E. long. 19° 12'.

Faro, a town, regularly built trading town of Portugal, in the province of Algarve, or Algarvês, the see of a bishop, suffragan of Evora. It is situated at the extremity of a small bay, in a level, and sandy territory, is defended by a small citadel, and contains two parish churches, four convents, and 5000 inhabitants. The harbour is a league below the town. Another arm of the river, or of the sea, forms an island, in which is the sandy cape of Santa Maria, very near the land. The tract between the town and the sea is marshy; on the opposite side it is flat and sandy; and at a distance appears the steep hills of San Miguel. The road to Tavira, 20 miles S.W. of it, is uncommonly pleasant. Its environs produce good wine and fruits, particularly figs, which are chief articles of exportation. N. lat. 37° 2'. W. long. 7° 57'.

Faro,
FAR

FARO, a town of the island of Sifjauto, N. lat. 56° 53'. E. long. 24° 40'.

Faro of Melos, a strait of the Mediterranean, between Sicily and Calabria, about 5 miles wide, remarkable for the tide's ebbing and flowing every six hours.

FAROE: a small island of Denmark, near the S. coast of Zealand. N. lat. 54° 57'. E. long. 12°.

FAROER ISLANDS. See FEROE ISLANDS.

FARON, a river of France, which runs into the Meuse, 12 miles below Vier.

FARONAGUR, a town of Hindoostan, in the foubah of Delhi; 35 miles W.S.W. of Delhi. N. lat. 28° 32'. E. long. 77° 45'.

FAROUT, or FAR-OUT, Head, a cape of Scotland, on the N. coast of the county of Sutherland; 30 miles E. of Cape Wrath. N. lat. 58° 40'. W. long. 4° 38'.

FARQUHAR, George, in Biography, son of a clergyman in the north of Ireland, was born at Londonderry about the year 1768. He received his university education at Trinity college, Dublin, where he was not distinguished for superior talents, and from which it is supposed he was expelled for want of moral conduct. He discovered an early taste for poetry and dramatic exhibitions, which led him to try his powers as an actor; but in one of his early attempts he had the misfortune to wound a brother-player, by using his sword in mistake instead of a foil, which put an end to his hopes in that profession. In 1766 he came to London, obtained a lieutenant's commission through Lord Orrery, and entered the military character a considerable time. He brought out, in 1698, a play, entitled "Love and a Bottle;" this was his first effort as a writer for the stage, and it obtained for him much popularity. The "Confiant Couple" or a "Trip to the Jubilee," was his next play, which was acted with great applause, and which has maintained its reputation to the present day. At this period Mr. Farquhar was in Ireland, probably in his profession as a soldier; but his letters contain humorous descriptions of the manners and customs of that country. In 1792 he published a volume of miscellanies, consisting of poems, letters, essays, &c.; and in the following year the "Jaconant, or the way to win him," was acted. He now married a lady, whose awful attachment induced her to pass herself upon him as one polefled of a large fortune. When he discovered the stratagem, he freely forgave her for the motive. He still continued to bring out new pieces; and in 176, the "Recruiting Officer" was acted. This has proved one of his most popular plays, and is now acted with much applause in all our country theatres; the humour of ferjeant Kite, with the incidents of the captain in country quarters, being levelled particularly at those auditors who are usually found there. "His last piece was entitled "The Beau Stratagem, which, though composed in six weeks, is reckoned the author's master-piece. Notwithstanding his success as a writer, he was a neccissitous man, and was obliged before his death to sell his commission to supply his need. He died in the spring of 1797, at the early age of 30, leaving behind him two daughters wholly unprovided for. His comedies, though not equal to those of Congreve, are sprightly, pleasant and natural, interesting in their plots, and easy in their dialogue. They are, however, very licentious; a character which belonged to all the comedies of that period, and which has undoubtedly given a distaste for theatrical amusement to multitudes who would otherwise refer to the theatre for instruction as well as pleasure. Biol. Brit.

FARQUHAR'S ISLAND, in Geography, an island in the Mer-
FAR

Farsa, a town of European Turkey, in Thessaly, ancient Pharsala, the site of a battle; 15 miles S. Lencide.

—Alfo, a town of Italy, in Sabina; 16 miles N. of Tivoli.

FARGANG. See Farsang.

Farschout, a town of Upper Egypt, which is ill-built, and bears every appearance of wretchedness. It is situated on the west side of the Nile, at more than two leagues from it, and is about a mile in compass. It is the residence of a sheik, who is not only the governor of this town, but also of several adjacent districts, to a considerable extent. The environs are pleasant, and most of the roads that lead to the town are planted with Acacia trees. Between it and the Nile lies a town called "Bajoura," the residence of a sheik. The harbour of both these places is a small village, named Sahet. Somnini thinks it probable that Fartafort stood upon the site of Acanthus, an ancient city of Egypt, near which there was a sacred wood. Another city of the same name stood on the spot where Daphour is now built, a little to the south of Saccara. At Fartafort there is a convent of Franciscans. It lies 20 miles S. of Gireg, the capital of Upper Egypt.

Farsidunga, a town of Bengal; 40 miles N.W. of Beychas.

Farsistan, Fars, Perisa, or Perisa Proper, a province of Persia, surrounded with mountains on the north and W., and on the E. separated by a desert from Kerman. In the north and W. lies Isfahon, Chahidan or Chosfiah to the west; Lariatan and the Persian gulf towards the south, and Kerman calls. This province contains the beautiful city of Shiraz, or Schiras, the capital; together with Ilakar, and the ruins of Periopolis. It is about 320 miles long from N. to S., and 360 from E. to W. Towards the south the air is very hot, and the wind so sandy, that it produces little else than palm-trees; towards the north it abounds with mountains, on which are found the most beautiful falcous in Persia, wild fowl, and wild cats. The principal productions of the cultivated parts are rice and fruit. See Persia.

Fartack, or Fartach, a sea-port of Arabia Felix, in the province of Hadramaut, belonging to the sheik of Kedjehim, 132 miles S.E. of Hadramaut. N. lat. 15° 36'.

E. long. 51° 4'.

Fartack, or Fart-rela, Cape, a cape on the east coast of Arabia Felix, opposite to Gardefin or Gardefan; the distance between them, in a line drawn across from one to another, being not above 50 leagues. The breadth between these two lands diminishes gradually for about 150 leagues, till at last it ends in the limits, whose breadth does not seem to be above 6 leagues. Bruce's Travels, vol. i. p. 315. N. lat. 15° 30'. E. long. 51° 4'.

Farthel, or Fartpheling, among Semins, was used for the name in what they commonly call furf, or furlings, which is taking up the fails, and binding them close to the yards.

Fartthing, a small English copper coin, amounting to one-fourth of a penny. It was anciently called fourthing, as being the fourth of the integer or penny.

Fartthing of Gold, a coin used in ancient times, containing in value the fourth part of a noble, or 20d. silver, and in weight the fifth part of an ounce of gold. It is mentioned in the flat. 9 Hen. V. cap. 7, where it is enacted, that there shall be good and just weight of the noble, half-noble, and farthing of gold.

Fartthing of Land, in Rural Economy, a term anciently employed to signify a certain quantity of land, but which, at present, is not well ascertained. It would seem, however, to differ from that of farthing-land, as Blount has shown from an entry made in an old survey-book of the manor of West-Hampton in the county of Devon, in which it is stated that A. B. holds six farthings of land at 12d. per annum. Consequentially the farthing of land must be of considerable extent, a great deal more than a road, which is the quantity supposed by the former term.

Fartin, in Geography, a small river of the county of Kerry, Ireland, running into the Atlantic ocean, opposite to Valentia island.

Fartrey, a river of the county of Wiltshire, Ireland, which runs into the Irish sea, at the town of Wiltlow.

Farsac, a town of Egypt, on the easter branch of the Nile; 18 miles N. of Cairo.

Forschufel of Land, a term formerly used to signify the farse as farthing-land.

Fasat, in Geography, a town of Perisa, in the province of Sefellian; 35 miles N. W. of Zareng.

Fasco, Fasco, in Heraldry. See Fesse.

Faces, in Antiquity, axes tied together with rods or flaves, and borne before the Roman magistrates as a badge of their office and authority.

Florus, lib. i. cap. 5, affirms us, that the ufe of fafoes was introduced by the elder Tarquin, the fifth king of Rome, and that they were then the mark of the sovereign dignity. In after-times they were borne before the consuls, but by turns only, each his day; "Ne fi ambo fafoes habeantes duplicius terror videretur." (Livy, lib. ii. cap. 1.) They had each of them twelve, borne by so many ushers, called licitors. (See Lictor.) Dionys. Halicarn. lib. iii. cap. 84.

Others will have Romulus the author of the institution, and ascribe the number twelve to the number of birds which foretold him his kingdom. Others hold that he borrowed it from the Etrurians, and that the number twelve answered to the twelve nations of Etruria, who, in creating him king, gave him each an officer to serve him as licitor. Silius Italicus ascribes their first invention to a city of Etruria, called Vetulonia.

These fafoes consisted of branches of elm, in the middle whereof was a handle or ax, the head whereof stood out beyond the heel. Plutarch relates the reason of this disposition. Publicola took the ax out of the fafoes, as Plutarch affirms us, to remove from the people all occasion of terror. After the consuls the praetors assumed the fafoes. Conon, De Die Nat. obser., observes, that the praetors had only two, though Polybius and Plutarch give them six.

In the government of the decemviri it was the practice at first for only one of them to have the fafoes; afterwards each of them had twelve, in the same manner as the kings.

In funeral processions it was the custom to carry the fafoes reveried, as a token of grief.

Fascets, in Gilfi Making, the irons thrust into the mouths of the bottles when made to remove them into the annealing-tower.

Fasch, Charles, in Biography, chamber musician to the late king Frederick II. of Prussia, and fon of the celebrated chapel-maker. He succeeded Emanuel Bach as harpsichord player at his majesty's concerts. His reputation as a performer was very high 50 years ago, and in his compositions for his instrument the greatest fire and delicacy are united.

Fascia, in Architecture, by the workmen called Facia, Facio, or Face, a broad flife, fillet, or band, particularly used in architraves and pediments.

The architrave consists of fafoe or bands; thus called by Vitruvius, as referring to what, called in Latin fafes.
That author admits of no fascia in the Tuscan and Doric architrave; i.e., he makes it all plain, without any division or cantoning into parts or fasciae; but the modern architects take the liberty to differ from him in this particular.

In brick-buildings, the jutting out of the bricks beyond the window-sills in the several stories, except the highest, are called fascias or façades.

These are sometimes plain, and sometimes moulded; but the moulding is only a linea recevers, or an ogee, at the bottom, with two plain courses of brick over it; they are irregular, and lastly a baldouine.

**Fascia.** In Anatomy, is the thin tendinous covering which surrounds the muscles of the limbs, and binds them in their places. The term seems to have been suggested by the analogy of these parts to bands; which they resemble in embracing and closely pressing the muscles, &c., which they cover. The word aponeurosis is sometimes employed. A general account of the structure of these organs will be found under the article FIBROUS SYSTEM; we have to describe at present the situation and connections of the individual fasciae.

The organic fillets of thin fleeces of a fibrous texture, differ considerably in their strength at different parts; at the outside of the thigh and fore-arm they are very strong; much thinner on the inner side of the limbs; and particularly thick and dense in the sole of the foot. Where they surround the whole of a limb, they generally are connected to one or more tenor muscles, which have the power of stretching them. These muscles, being put in action when the reft of the limb is exerted, render the faecia tene, and thus bind down firmly the other muscles. They are relaxed when the limb is at rest; and the faecia consequently become loose. We cannot explain very clearly how the action of muscles is facilitated, nor how the amount of their exertion is increased by the pressure of the faecia; yet some effect of this kind is probably produced. Workmen often bind their limbs when about to exert considerable muscular power, on the supposition that it favours exertion; and firm bandaging, as employed in surgery, serves in many instances to strengthen parts very considerably. A person who had bruised the muscles of the loin found great benefit in a firm bandage round the body; which diminished his pain, and enabled him to move his trunk with ease, which before he could accomplish only with the greatest difficulty. Couriers in the East, who go on foot for great distances, find themselves benefited by bandaging the trunk.

The habitual compression of the faeciae favours the circulation of fluids in the limbs. Hence the varices, which are common in the superficial veins, placed externally to the faeciae, are never met with in the deeper-seated vessels: and the mode of method of curing these affections is by the artificial compression of bandages. For the same reason, anaphrodisac deposits in the cellular membrane always appear much later and to much smaller extent within the faecia than in the sub-cutaneous cellular texture.

Fasciae are connected, on their internal surfaces, generally by means of loose cellular texture, to the muscles; sometimes, however, the fibrous fibres derive their origin from the faecia, which cannot, in such cases, be detached without cutting the substance of the muscle. Sometimes the faecia extend from their inner surface between the muscles down to the bone. These add to the strength of attachment, and offer a surface for muscular origin. Externally, faeciae are connected to the integuments by a yielding cellular structure; and the superficial nerves and veins are generally interposed between these parts.

The faecia of the arm—The faecia of the arm is one of the thinnest and most delicate of these organs, and approaching in its texture almost to a condensed cellular substance. It seems to arise among that substance in the axilla, and is manifestly continuous, at the front and back of the arm, with expansions proceeding from the latissimus dorsi and pectoralis major. On the anterior and external aspects of the deltoid it does not seem to exist, commencing apparently below the muscle. Behind, it is continuous with the aponeurosis covering the infraspinatus. Descending along the arm, it envelopes the brachial muscles, and adheres to the septum at the outer edge of the brachialis externus. It is continuous in a great measure with the faecia of the fore-arm, and has attachments to the two condyles of the humerus.

Every where sub-cutaneous, this faecia is covered merely by the superficial veins, lymphatics, and nerves of the arm. It envelopes all the brachial muscles, as well as the arteries, veins, and nerves, which form a large fasciculus depending on the inner surface of the limb. Its texture, finely cellular in many points, offers manifell tendinous fibres in others; and it exhibits very clearly the continuity of the aponeurotic and cellular structures. The pectoralis major and latissimus dorsi, and to an extent to be regarded as its tensor muscles; but they cannot act on it with very great efficacy, as their fibres pass very obliquely with respect to the faecia.

**Fascia of the fore-arm.**—This covers the muscles of the fore-arm. Its origins above are, from the faecia of the arm, with which it is continuous, from the production furnished by the tendon of the biceps, and from the condyles of the humerus. It descends over the whole surface of the fore-arm, terminates behind at the annular ligament, which binds down the exterior tendons at the back of the wrist, and in front at the annular ligament of the hand. Separated from the skin by the superficial veins, nerves, and lymphatics, this faecia covers all the superficial muscles of the fore-arm, connected to these generally by cellular tissue. Near the cubital end of the limb it adheres closely to the muscles; and sends aponeurotic septa between them; viz. in front between the pronomter teres, palmaris longus, flexor sublimis, and flexor carpi ulnaris; behind between the extensor carpi radialis brevis, extenor communis digitorum, extensor digiti minimi, extensor carpi ulnaris and anconeus. On the radial side of the limb it has no attachment: it is fixed to the olecranon, and to nearly the whole inner edge of the ulna, where it affords origin to the flexor carpi ulnaris.

The anti-brachial faecia differs from that of the arm by its much greater density and strength. Its component fibres decussate each other in various directions, without full swing any fixed course. The biceps flexor cubiti is the tensor of this fascia, by means of the production arising from its ulnar side, covering the brachial vessels at the bend of the arm, and expanding into the fascia at the upper and inner part of the limb.

The annular ligament of the fore-arm may be regarded as a part of the faecia, terminating & upwards towards the back of the hand. Several fibrous septa belonging to the exterior tendons (see Extensions) are placed under this ligament:—the chief of the three extensors of the thumb, the extensor carpi radiales, extensor digitorum communis, indicator, extensor proprius anularis, and extensor carpi ulnaris. The tendons belonging to these muscles are independent of each other; each possessing peculiar transverse fibres of its own. They are all covered by the annular ligament, which consists of longitudinal parallel fibres, very white and delicate, and separated by vascular intervals. Implied in the external and inferior part of the radius, it closes the back of the wrist obliquely, covering and intimately adhering to the above-mentioned fibrous septa, and is attached
tached slightly to the extremity of the ulna, but chiefly to the os pisiforme.

Palmar fascia. aponeurosis palmaris—is a very strong aponeurotic layer, composed of firm and close fibres, forming a triangular form, and covering particularly the middle of the hand. Towards the wrist it arises from the annular ligament of the hand (which is described in the article EXTREMITIES), and from the tendon of the palmaris longus. It is continued to the digital extremities of the metacarpal bones, growing broader, having its fibres separated from each other, and divided at last into four distinct portions. There are, however, very obvious transverse fibres connecting together the longitudinal ones after they have separated. Each portion of the fascia splits into two divisions, embracing the flexor tendons, and there inserted into the ligaments belonging to the digital ends of the metacarpal bones.

From the edges of the palmar fascia a thin continuation is sometimes observed to extend over the muscles of the thumb and little finger.

The palmar fascia is closely connected to the skin, some of its fibres being apparently connected to the inner surface of that organ. It covers the flexor tendons of the fingers, the lumbricals muscles, the trunk and ramifications of the ulnar artery, and the digital branches of the ulnar and median nerves, confines these organs in their relative situations, and gives to the palm a firmness well suited to its office of seizing and holding external objects.

The two following are its tenor muscles. Palmaris longus, ulnaris gracilis, petit palmaire,—are the different names given to a long and very slender muscle, placed in the forearm near the ulnar edge of the flexor carpi radialis. It arises from the common tendon connected to the internal condyle, and from the aponeurotic septa, which separate it from the neighbouring muscles. A small rounded fasciculus of fibres very soon forms a thin and flat tendon, which takes a straight direction to the annular ligament of the hand, where it becomes broader. It is inserted by a few fibres into that ligament, but is chiefly expanded into the palmar fascia. This muscle sometimes does not exist. It is placed between the fascia of the forearm and the flexor digitorum sublimis. It will exert a most marked effect in rendering the fascia tense; and it has an equally decided influence in bending the wrist.

The palmaris brevis, or cutaneus,—is a small thin and flat plate of fibres, generally disposed in separate fasciculi, situated under the integuments on the ulnar side of the palm of the hand. It arises from the edge of the palmar fascia, takes a transverse course, and is attached to the integuments of the inner side of the palm. Covered everywhere by the integuments, it lies upon the adductor and flexor brevis muscles, on the ulnar artery and nerve. It renders the fascia tense, and draws the integuments inwards.

Fascia of the thigh. fascia lata, vagina femoris, aponeurose crurale.—This, which is the largest and strongest fascia in the body, covers all the muscles of the thigh. It is strongly connected to the crus arch, in the groin, and it extends over the bones of the pelvis into the abdomen. It is also concerned in covering the femoral vessels where they appear at the front of the thigh, under the crus arch.

The iliacus internus is covered by a thin fascia, to which the broad tendon of the psoas parus is connected when that muscle is present. This fascia is attached above to the internal edge of the crista ili; on the inner side to the brim of the pelvis; externally, to the posterior surface of the crus arch, where it consists of two layers, with the circumflex vessels of the ilium passing between them; and in front it is continued over the os innominatum into the thigh. This has recently been described by the name of fascia iliaca. Its posterior surface covers the iliacus internus, a part of the psoas magnus, and of the anterior crus-nerve. Its anterior surface is covered by the small superficial branches of the lumbar nerves, which pass through perforations in the fascia, near the crus arch; by the external iliac artery and vein; and by the peritoneum; all which parts are connected to it by the intervention of a loose cellular texture. The attachment of this fascia to the crus arch is continued only so far as where the iliac vessels pass out; at that point it descends to the thigh, forms the posterior part of the sheath including the femoral vessels, and is continuous with the fascia lata. The second origin of the fascia of the thighs is from the anterior surface of the crus arch, from the anterior superior spine of the ilium to the point at which the arch begins to be attached to the pubes. In the whole of this space the fascia lata and aponeurosis of the obliquus externus abdominis, are continuous, and are maintained by their continuity in a plane of reciprocal tension. Hence, when the thigh is extended on the pelvis, all these parts are very tense; and they all become loose on bending the limb. Hence, too, in the extended state, the crus arch is drawn down towards the thigh, so as to represent a convex line. The third origin of the fascia is from the front edge of the pubes, just over the attachment of the pectineus, and under the point at which the crus arch is inserted into that bone. This portion is continuous with the iliac division of the fascia. The rami of the pubes and ischio, and the outer edge of the crista ili, are other points of origin. Behind, its commencement cannot be very clearly described; it appears to arise insensibly among the cellular substance over the glutaeus maximus, and is first distinctly visible about the tendon of that muscle.

From the various attachments now enumerated the fascia defends over the thigh, embracing all the muscles, fending various productions between them, and terminates at the knee; still, by mingling in front with the common tendon of the extensors of the knee, and with its lateral productions; 2dly, behind, by extending over the hollow of the knee, and being continued into the aponeurosis of the leg; and, 3dly, at the sides, partly by mixing with the last-mentioned aponeurosis, and partly by insertions into the internal and external tuberosities of the tibia.

The fascia is covered in general simply by the integuments, with the addition of the superficial veins, nerves, and lymphatics. The absorbing glands, through which the latter pass, are found in the groin externally to the fascia. At this point the fascia lata of the thigh, as well as the lower part of the aponeurosis of the obliquus externus abdominis, is covered by a thin sheet of condensed membrane, consisting of several layers intermixed with the absorbing glands, and fleshy shewing a very distinct fibrous texture. This has been described by the name of the superficial fascia; and, together with the lymphatic glands, it lies exterior to the fascia lata.

The internal surface of the fascia is in contact with the various superficial muscles of the thigh. On the front it covers the rectus and vasti, and includes the vastus in a peculiar sheath. Behind it is placed over the semi-tendinosus, semi-membranosus, and biceps; leading between the short head of the latter muscle and the vastus externus a strong septum, implanted in the external lamina of the linea aspera, and affording origin to the two muscles. It is interposed, for a short space, between the glutaeus maximus and medius; and afterwards the front edge of the latter has a most extensive
tentive and powerful connection to it. (See Cluteus.) In front of the edge of the latter muscle it covers very closely the gluteus medius, which arises here from the inner surface of the fascia. It then encloses its own tenor muscle in a peculiar sheath, which unites it closely to the gluteus medius and minimus. On the inner side of the thigh it covers the muscles, without displacing any productions between them.

It is extremely dense and thick on the outside of the thigh; much less so in front and behind; and thinnest on the inside; when in the neighbourhood of the perineum, it can hardly be recognized as possessing a fibrous texture. Fibres decussating each other in every variety of direction, compose its substance. Veins and nerves perforate it in various situations; e.g., the saphena minor vein in the ham, and several superficial nervous twigs on the front and upper part of the thigh.

The most conspicuous opening, however, is near the inner end of the crural arch, where the great saphena palstit to the femoral vein.

Here we find a large oval depression, bounded upwards and outwards by a crescent-shaped production of the fascia, called the femoral notch of the fascia lata, or the falciform process. In describing the origin of this latter, we have mentioned its continuity with the crural arch. Taking this from the ilium downwards, we come to a part, near the front of the arch, where the fascia is folded inwards, and connected with the thin posterior border of the tendon of the obliquus externus.

Now this portion covers the passage of the femoral vein, and forms the anterior boundary of that division of the fascia which arises from the crural arch. It terminates here by a thin, sharp, and lunate edge, of which the upper corner is connected to the crural arch, the concavity is turned towards the opposite limb, and the inferior corner turns again upwards and inwards, so as to form another very sharp edge, bounding the oval space below. The saphena interna, or major, passes over this inferior sharp edge to join the femoral vein. The parts now described bound the oval opening above, on the outside, and below. The internal boundary is wanting, and the depression is here continuous with that part of the fascia lata which covers the perineus muscle. By pressing the handle of a knife close on this portion of the fascia, we elevate the femoral vessels, so as to show that they are not here covered by fascia lata; and we prove that the fascia palstit behind them, and becomes continuous on the opposite side with the semi-lunar edge.

The tenor muscles of this fascia are the gluteus maximus, (see Cluteus,) and the tenor vaginae femoris. The latter, called also musculus fascie latae, and tenor aponeuroticus cruralis, is placed at the upper and outer border of the thigh. Elongated and flattened in its form, it increases gradually in breadth from above downwards. Its origin is from the anterior and superior spine of the ilium, where it lies between the faboriters and gluteus medius; it descends, passing obliquely outwards, and growing broader by the divergence of its fibres, and terminates by a broad insertion into the external part of the fascia lata. It is in contact, at both surfaces, with layers of the fascia, which include it, and unite into one lamina at its insertion. The thin portion of fascia, which covers it externally, separates it from the integuments; and the posterior layer from the rectus and vastus externus. On its outer edge, it is in contact with the gluteus medius and minimus.

Besides the tension of the fascia lata, which is the first effect of this muscle, and by which it may be supposed to aid the action of the subjacent muscular organs, it rotates the thigh inwards; and it will assist also in bending the limb on the pelvis. Supposing the thigh to be fixed, the tenor vaginae may incline the pelvis laterally; and, in the attitude on one foot, it may rotate the pelvis outwards.

The fascia of the leg, fascia aponeurotica cruris, aponeurosis jambers—analogous in structure, but inferior in strength to that of the thigh, envelopes the muscles placed on the corresponding part of the lower extremity. Behind, it is continuous with the fascia lata; as also on the outside, where it arises further from the extremity of the fibula, and from the tendon of the biceps flexor cruris; on the inside its origins are from the expanded tendons of the fatoryus, semi-tendinosus, and gracilis. The crural aponeurosis descends from these points over the posterior, external, and anterior aspects of the leg; but not over the internal, consisting of the broad surface of the tibia, which is immediately subcutaneous, and has the fascia attached to its two edges. Below, this fascia is continued into the superior annular ligament; on the outside it is continuous with the fibrous sheaths enclosing the tendons of the peronei; within, with the internal annular ligament; and behind, it is indecisively loit towards the heel, being apparently connofed with the cellular subcutaneous tissue.

This fascia lies immediately on the muscles, being covered externally by the integuments, superficial vessels, &c. It is thick and very tense on the front and outside of the leg, binding the muscles together very closely. In these aspects its internal surface gives origin above to the fleshy fibres of the tibialis, extensor longus digitorum, plantae, and peroneus longus; while below it is connected to the muscles by cellular subcutaneous tissue. Two septa are continued from it; between the extensor communis and peroneus longus, and between the latter muscle and the flexor. Both these partitions are attached to the fibula. It is much thinner, and more loose on the calf of the leg; and is attached to the muscles by a loose cellular texture. At the lower part of the back of the limb it divides into two layers; a superficial and thinner one covering the tendo Achillis; a thick and deep-seated division passing in front of the tendon, embracing very closely the muscles which lie on the back of the bones, and separating them from the muscles of the calf. The latter is fixed to the edges of the tibia and fibula below, and is indistinctly loit in the cellular subcutaneous tissue.

The biceps flexor cruris, on the outside; and the fatoryus, gracilis, and semi-tendinosus on the inside are the tenors of this fascia.

Superior annular ligament of the foot.—This is a strong tendinous plane, covering and confining the tendons on the back of the foot, and continuous with the crural fascia. Arising from the superior depression of the os calcis, where its fibres are surrounded by much fat, it passes inwards, dividing into two layers, which form a sheath including the tendons of the peroneus tertius, and extensor longus digitorum; then continues over the tendons of the extensor longus hallucis, and tibialis anticus; and is fixed in front of the internal malleolus. A production of it is continued over the last mentioned tendons to the os scaphoides and planter fascia. This ligament differs from that of the hand, as the sheaths of the tendons are formed in it by the separation of its fibres. Continuous above with the crural fascia, it ends below in the dorsal aponeurosis: it is covered by the integuments, and lies upon the tendons, and the extensor brevis digitorum.

The internal annular ligament—is a thick and broad fibrous plane, arising from the lower and front part of the malleolus internus, and inserted into the inner and lower edge of
the os calcis. It forms the internal concavity of the latter bone, as a channel, containing the fibrous sheaths of the tendons of the toes; the posterior tuberous and vesicles, and a considerable quantity of fat. The cranial fascia is continued into it above; it gives origin below to the abductor hallucis; and it is covered externally by integuments.

Dorsal fascia of the foot.—This is a thin, and sometimes hardly distinguishable fibrous plate, arising from the front edge of the superior annular ligament; descending over the extensor brevis digitorum; slightly attached to the sides of the metatarsus; and fold towards the toes in cellular substance.

Plantar fascia; fascia aponeurotica plantaris; aponeurose plantaire.—This is a very thick, dense, and firm fibrous organ, covering the middle and sides of the folds of the foot. Its origin is from the plantar and inferior part of the os calcis; pulling forwards, it soon divides into three portions separated by two deep grooves. The lateral divisions close the abductor hallucis, and the abductor minimi digiti; and grow thinner towards the front, where they are connected to the edges of the foot. The external is strongly attached to the last metatarsal bone. Their opposite edges are connected by crests portions to the middle division. The latter, which is the principal portion, palisades forwards, growing broader and broader, and divides at the front of the metatarsus into five pieces. Each of these subdivisions into two others, which have lateral attachments to the metatarsal bones, and leave an interval occupied by the flexor tendons, lumbricales muscles, and the digital vesicles and nerves.

The planar fascia is extremely thick and close in its texture behind; but its fibres are more scattered in front. Many filaments proceed from its inferior surface to the skin, interrupting portions of fat. Its upper surface is in contact with the three superficial muscles of the foot, and affords a point of origin to their fibres. It dispatches between these two counterparts in situ to the two grooves already mentioned. It has no tenor muscle.

The fascia tarsalis—is a thin production extended from the crural arch between the transversus abdominis and peritoneum; see OBLIGUS externus abdominis.

Bichat; Anatomie descriptive, vol. 2. Murray, De fascia lata. Upfal; 1777. Barth, Muskelkrelle; with plates. Cooper's plates of hernia, part 2, with the descriptions. Burn's observations on the structure of the parts concerned in crural hernia; in the 2d volume of the Edinburgh Medical and Surgical Journal; p. 265.

FASIA, in Surgery, a bandage, fillet, roller, or ligature. See BANDAGE.

FASCICULUS, or Fasciule, in Roman Antiquity, were pieces of cloth, used by the Romans, who wore neither stockings nor breeches, for wrapping their legs and thighs; and they were demonstrated from the parts which they covered, viz. tibialis and femorales.

FASCICULUS, in Astronomy, two rows of bright spots observed on Jupiter's body, appearing like feathers or belts. The fasciculi, or belts of Jupiter, are more lucid than the rest of the disk, and are terminated by parallel lines. They are sometimes broader, and sometimes narrower; nor do they always parallel the same part of the disk.

M. Huygens likewise observed a very large kind of fasciculus in Mars; but it was darker than the rest of the disk, and took up the middle thereof. See BELTS.

FASCIALIS, in Anatomy, a muscle of the leg, called also fatorinus.

FASCICULATE, in Botany, applies to leaves when gathered together into a tuft, as in the larch and cedar; and occasionally to such small leaves as form axillary clusters in several plants, as in the pink, or Sandwort tribe, some species of Selago, and many others. A fasciculate or clustered stem is a preternatural luxuriance, or deisace, of that part, in which numerous branches or items appear to cohere longitudinally into one, affuming a broad, flat figure, crowded with leaves, flowers, or both, at the extremity, and bearing occasionally a few scattered leaves here and there at the sides. We have seen it in the Afn, Helly, Delphiac, Anthericum, Ranunculus, &c. In compound flowers, as in the Anthemis or Matricaria, the receptacles are sometimes united into one linear series. In the Top-knot Pea, Pifum comosum, Rivin. Pentap. Irr. t. 58, the fasciculate item is a permanent variety, propagated by seed. The leaves of this pea has no catkin-like lining, and is therefore entable entire. Fasculated flowers are such as grow in a peculiar form of inflorescence, termed a fasciculus. See that article. S.

FASCICULUS, a fascicle, is one form of inflorescence, composed of several flowers, supported on little stalks variously inflected and subdivided, collected into a close bundle, level at the top; as in the sweet William, Diasia: turbaria.

FASCICULUS, in the Materia Medica, a term sometimes used to express a certain quantity or measure of herbs.

By fasciculus is meant so much as may be held in the arm when bent, and rolled on the top of the hip. Physicians note it in prescription by fas.

FASCINATION denotes a sort of witchcraft, supped to operate by the influence either of the eye or the tongue.

The word is formed from the Greek, ΕΚΣΑΣΗΜΟΝ, which signifies the fame.

Ancient writers distinguish two sorts of fascination, one performed by looking, or the efficacy of the eye. Such is that spoken of by Virgil in his third eclogue:

"Neceo quis teneros oculos mihi fasciatis agnos."

The second by words, or especially malignant prayers. Such is that mentioned by the same poet in the seventh eclogue:

"Au, si ultra placitum lanciari, haccire frontem
Cingite, ne vati noceat mala lingua futura."

Horse touches on both kinds in his first book of epistles:

"Non illic obliquo oculo mea commoda quisquam
Limat, non odio obfeuro, moruque venenum."

Among the Romans there was a deity called Fascinus, who prevented fascination or enchantment.

FASCINE, a bundle of boughs, twigs, &c. firmly bound together, and made of certain dimensions, according to the use for which it may be intended. Fascines are much used in field-fortification, for the purpose of retaining loose soil within certain spaces, such as the mounds of batteries, the defences of trenches, the raising of espaliers, &c. Simple as the formation of a fascine may appear, for it is nothing more than a faggot, much attention to method is requisite towards their being rendered equal in size, and compact in every part. When such a convenience can be had, it is proper to make them on treffles, or any kind of support placed at about two feet asunder from centre to centre: forked ficks driven into the ground answer admirably, as they receive the several ficks, but allow ample space for the bands, which should be of hazel, birch, or other pilent tough wood, that will bear to be well twitted. In the first
The following will be found requisite for the construction of a faéchine battery of two guns, or howitzers.

90 Faéchines each 9 feet long.
20 Ditto 18 ditto.

This number will face the outside, as well as the inside, of the embrasures; which, if the earth be stiff, will not always prove necessary, at least not higher than the soles of the embrasures on the outside. In the latter case, five faéchines, of nine feet each, will be spared for other uses.

A mortar-battery will not require any long faéchines, (i.e. of 18 feet,) for lining the embrasures; but if a battery be so exposed as to require a shoulder (embrasure) to cover it in flank, about six faéchines, of nine feet, will be necessary for that purpose. The simplest method of ascertaining the number of faéchines for a mortar battery, or for any other plan of broad-work, is to divide the length of work to be faéchined by the length of each faéchine in feet; multiply by the number of layers, and the result will show the number of faéchines required.

Every faéchine will require a picket for every yard of its length, and one for its extremity; thus, one of 18 feet will require eleven pickets; nine feet, four ditto.

Observe, that where any fractional part exceeds a foot, an additional picket must be given. By adding to the above computation 50 faéchines of nine feet, and 10 of 18 feet, the number of faéchines, and consequently of pickets, for every additional gun may be ascertained. But as, owing to the damages inflicted from the fire of the enemy, repairs will often be necessary, it is proper to have a certain number of spare faéchines, at some secure depot, for that purpose; and as parts of the wadding, &c. are apt to be impelled towards the faéchine-remetements of the embrasures, water should always be at hand for their extinction. Nothing is more common than for the besieged to make a forge, with the intention of burning the breeching and mortar batteries.

FASCINERY, in Engineering, signifies wattled wood or hedge-work for groins, &c. to retain the pebbles or beach, and break the waves on the sea shore. Smollett's Reports, i. 271.

FASCIOLA, in Zoology, a genus of intestinal worms, with which man, and various animals, are afflicted. The body is flaccid, with an aperture at the anterior extremity, and another in the middle of the abdomen, or at a distance beneath. Some are of considerable magnitude, being from one to two inches in length; others of a smaller size; but all are scarcely perceivable, and they differ little in their habits of life, being either solitary or gregarious. They occur most frequently in the mucous of the stomach, the intestines, and liver; or sometimes in the flesh immediately under the skin, examples of which have been observed in many kinds of fishes, and in some quadrupeds. When they occupy the biliary canal in animals, they tumefy all the parts, and become the source of many maladies; an effect too generally experienced in that useful creature, the common sheep, and also in cattle. The particular kind with which the sheep is infested (F. hepatica) is known among agriculturists by the familiar name of fluke, or Gourd-worm, and is sufficiently understood to be the occasion of the droppings, and albs of that disorder usually called the rot, in which case the wool falls off the infected carcass, and the animal perishes miserably. Sometimes these pernicious internal depredators are found in brooks, and other watery places, where it is concluded they have been vomited by the afflicted sheep, and dropped into the water.

The labours of Gozeé, Müller, Blech, and other naturalists have tended, in a remote degree, to elucidate the habury.
FASCIOLA.

history of those particular species which infest the more useful kinds of domestic animals in Europe. Much, however, we are perfused, till remains to be observed, even in this partial branch of the economy; there are probably many other species which infest those animals already examined, but which, from their ambiguity of character, or extreme minuteness, have hitherto eluded the vigilance of the observer. Again, those which infest the inferior tribes of European animals have scarcely claimed the least attention, and such are peculiar to animals in hotter climates than those of Europe appear, with one or two exceptions, to be utterly unknown. The latter we conceive to be numerous indeed, and this idea is rendered probable, when we consider how exceedingly conducive the heat, even of our own climate, is known to be to the increase both in size and numbers of those destructive inmates.

These vermes are declared hermaphrodite, and the supposition is plausible, because it has been ascertained, from accurate inspection, that among the immense numbers of the variegated kinds which occasionally occur together every individual is furnished with ovaries; but it must also be admitted that we are not so fully conversant with the mystery of their generation and manner of life as to speak with certainty even from this circumstance, although it hence appears an admissible opinion. The females adhere by means of the abdominal as well as the anterior pore, the latter of which is however the true mouth through which they derive fulness, and from whence the intestinal cavity may be traced to the intestines, and thence to the vent or abdominal pore. The intestines are flexuous, and the ovaries placed laterally.

Species.

* Inflating Man.

** Humana.** Doerri, ver. cler. lumbr.

Vulpis. Orbicular; head thick, rounded, and separated from the trunk by a circular arch; posterior part flexuous at the sides; tail with two cylindrical membranaceous appendages each side. Goeze.

Found in the intestines of the fox, and is not perhaps of this genus.

Putorii. Minute and subrotund, with two approximate pores. Goeze.

Length an inch and a half; the species found in the intestines of the molecat.

Melis. Thick; head triangular. Goeze.

Inhabits the intestines of the badger.

Vesperpilions. Elongated and tapering with red intestines. Müll.

Body reddish fuscous, and fleshly, with minute dots disposed in transverse lines. This kind is found in the intestines of the long eared bat, which it frequently penetrates and occasions death.


Infests the liver of the sheep, where it is generally found adhering by a pore at the extremity, and another in the middle of the abdomen, and occasions the disorder in sheep called the rot. The body is about an inch long, broader on the fore part, and terminated by a tube, the back marked with furrows. The five following kinds are considered by some as varieties of hepatica.

Bom. In the liver of cattle. Müll.

Porcorn. In the liver of swine. Goeze.

Aph. In the liver of bear. Cleric.

Cervi. In the liver of deer. Borlase.

Equi. In the liver of the horse. Bellom.

Aph. Body conico-ovate, with a very large aperture behind; mouth suffrangent and remote.

Inhabits the flomach of the stag, and is gregarious.

*** Inflating Birds.

Basil. In the gall-bladder of the black eagle. Braun.

Body thick, and gregarious.

Bultrini. Inhabits the intestines of the buzzard. Goeze.

Body with two pores.

Mylvi. Body flat with a double pore; intestines fompen.

Goeze.

Small. Found in the intestines of the kite.


In the intestines of the kite. Perhaps not of this genus.

Pellita. Very minute; shape various, inclosed in a cyct, and tenacious of life. Biaur.

Found in the thorax of the owl (Brixia alba), and also under the skin in the common hedgehog. Probably not of this genus.

Anatis. Reddish and roundish, with a single pore.


An internal worm, supposed to be of this genus, and which is found in the intestines of the common domesticated duck. The body is small, pellucid, and sometimes white; the anterior part ending in a truncated triangle, the posterior rounded; intestines black and flexuous; ovaries lateral.

Anseris. Oblong-ovate, with opposite papillæ placed in two rows; pores approximate. Froelich.

Found in the rectum of the common goose.

Grus. Inhabits the intestines of the crane. Bloch.

This may not be specifically distinct from fasciola anatis.

Ardea. Sub-ovarian. Goeze.

Found in vast numbers in the intestines of the bittern, which it often penetrates.

*** Inflating Reptiles.

Salamandra. Oblong, sub-linear, resembling an oil-flask; pores remote. Froelich.

In the rectum of the salamander.

Rana. Sub-clavate, mouth fompen. Goeze.

Found in the intestines, lungs, and liver of the frog; is very slow in motion, contracting itself into a globular form, and when diluted is broad and flatish.

Uncinula. Posterior part of the body armed with two chillic hooks. Braun.

Inhabits the frog under the common integuments of the abdomen, and occurs either solitary, or in number; its motion resembles that of the common locust.

*** Inflating Fishes.


Infests the intestines of various fishes; the body is of equal thickens, with papillary pores; the anterior one larger, and extending over the fore part of the body; tail filiform, and half as long as the body.

Distichas. Elongated, round, with a projecting excava ted lateral pore. Zoea.

Infests the intestines of various fishes; the body is wrinkled, and tapering behind; the anterior part some-
what bifid at the end, the divisions unequal, and excavated at the tip.


In the stomach of the whiting pout. The body is fearfully perceptible to the naked eye; pellucid, and protruding from the mouth a hard and hollowed spicule, with a white double filiform vessel, and another blackish flexible one filled with eggs extending the whole length of the body.

Aglerpin. Linear, and slightly depressed; no neck. Müll.

The length half an inch, colour cinereous, form rounded at the extremities.

Bleni. Linear, and flat; neck inflated with a divergent truncated base. Bloch. Found in the intestinal mucus of the viviparous blenny; size small, being almost imperceptible to the naked eye; colour white, pellucid, and generally curved into an obtuse angle; lateral pore large, placed in the angle of the body, and prominent when in motion with two white vehicles.

Scorp. Elliptic, and perforated at one end with a minute papilla; no neck. Müll.

In the intestines of the Father laher; invisible to the naked eye, pellucid, whitish grey, obtuse at each end, and filled with eggs.

Plates. Elliptic, and green. Müll. Extremely minute, opaque, divided into fix alternate spaces of green and white; terminal pore large, lateral one placed in the middle; eggs deep green. Found in the intestinal mucus of the plaice.

Lucioperce. Oval-oblong, and slightly ventricose; neck short; margin of the terminal pore dilated and smooth. Müll.

Size of a grain of sand; colour brownish; neck cylindrical; lateral pore slightly prominent, and narrower downwards. In the intestines of percic lucioperca.

Perce. Oval, ventricose; neck short; terminal, pore nodulous at the margin. Müll. Found in the intestines of the ruffe, and in size rather exceeding the former. The body is brown; neck white and cylindrical, granulated, and terminated by a pore; lateral pore at the base of the neck; body obtuse below.

Lagana. Body rounded; neck long. Braun. In the intestines of the common river perch.

Variga. Linear, round, neck divergent, obtuse, and perforated beneath the tip. Müll. Found in the stomach of the salmon. This is of an elongated form, often diverging into an acute angle, smooth when extended, and rather wrinkled when contracted; lateral pore nearly in the middle; a double filiform white vessel down each side, and connected below with two white opaque bodies of an ovate form; eggs numerous, scattered, yellowish green, and contained in a flexuous hyaline tube; each of the eggs included in a pellucid membrane.

Exiccia. Elliptic, hyaline, and rufous in the middle. Müll. Infests the intestines of sala oriox; the size very minute; anterior part of the body retractile, and extensive, including a filiform conglomcrated intestine, and two vehicles.

Fasimos. Oblong and a little depressed; the fore part with fix equal lobes on the margin. Müll. In the intestinal mucus of the salmon. The body is whitish, and about the twelfth part of an inch in length; the margin obtusely crenulated; the anterior lobes nearly square and membranaceous.

Umble. Oblong, flat, with a narrower retracile neck. O. Fabr. Found in vast numbers beneath the skin in the back of the salmon umbra. The length is one-eighth part of an inch; the body is whitish, and resembling a flake, broader behind, and obliquely truncated, the margin acute.

Luc. Lanceolate, with a created depressed margin; neck long and round. Müll. An inch and a half in length, the colour bright red; found in the stomach and cephalus of the common pike.

Halici. Found in the stomach of the herring. Leuw. Braun. Brama. Oblong, round, tapering, and obtuse at the base; neck rounded and slightly incurred. Müll. In the intestines of the bream. The body is white, the lateral pore at the base of the neck.

Jesis. Body ovate, the anterior part narrower. Bloch. Found in the intestines of cyprianus jesis, and resembling a flake, or long-necked bottle.

Trutta. Oblong, with two white lucid orbicular spots behind the lower aperture. Froel. In the rectum of the trout.

Clavata. Body roundish, livid, wrinkled, and elevated behind. Linnaean Tran.

Found in the stomach of the somber pelamis, in the Pacific ocean. The length is about two inches; the body whitish brown, with a bluish cast, and annulated with fine wrinkles; towards the lower extremity spherically gibbous, and terminating in an aperture; neck slender; pore larger than the terminal one.

Spiz. In the mucus of spars aurata, &c. La oaciola de la dorada, Bofe.

Brunnea. In the mucus of spars aurata. La oaciola bruné, Bofe.

Caudata. In the mucus of spars aurata. La oaciola caudata, Bofe.

* * * Insulting Worms.

Loliginis. Body oblong, white; mouth with transverse papillae. O. Fabr. Found in the intestines of the cuttlefish.

Fashion. The word is French, fasson, which signifies making.

Fashion is particularly used among Artificers, for the trouble, time, and labour, employed in a piece of work, particularly of silver or gold. It is by the fashion that the workman's wages, or salary, are regulated.

The word is also used to denote the prevailing mode or taste.

Fashions, a name sometimes given to the farcin.

Fashion-Pieces, in Sea Language, two pieces of timber which form the breadth of a ship at the stern, and are the outmost timbers of the stern on each side. forming its shape, and united to the stern-pole, and to the extremity of the wing-tranion, by a rabbit, and a number of strong nails or spikes driven from without.

Fasiano, in Geography, a town of Naples, in the province of Bari; 12 miles S. of Monopoli.

Faskani, a town of Japan, in the island of Eipes; 30 miles W. of Xenday.

Fassets, among Jewellers. See Farris.

Fassus, in our Old Writers, is used for a faggot of wood. It seems to come from the French faiseau.

Fast,
FAST.

The word, as a space of time wherein a person takes little or no food, has been professed by most nations from the remotest antiquity. The Jews observed fasts from their first establishment. Moses appointed one solemn fast before the feast of expiation; and others were instituted by the following prophets on different occasions: so that in the time of Zacharias there were four regular fasts, viz. in the months of June, July, September, and December. To these there were often added others, in memory of forefathers which they have at different times suffered. Besides these there are various kinds of fasts, some for devotion, others for the new moons; and some among them kept an anniversary fast in memory of the translation of the Septuagint, in order to expiate the false compliance of their doctors for a foreign prince, and the outrage offered to the dignity of their law, which, in their opinion, was only designed for themselves: "Non flet taliter omnia nit." There is no occasion to describe exactly the various obser-vances that accompanied these acts of humiliation, as they are generally known. Their obser-vances lasted twenty-seven or twenty-eight hours, beginning before sun-set, and not ending till some time after sun-set the next day. On these days they were obliged to wear white robes, in token of their grief and repentance; to cover themselves with fackeltoth, to lie on ashes, to sprinkle them on their head, and on great occasions to cover the ark of the covenant. In order to complete their obser-vances, they eat nothing at night but a little bread dipped in water, seasoned with salt, and bitter herbs and pulse. Some of them continued the following day and night praying in the temple, or synagogue, bare-footed, and occasionally scourging themselves. Those that would be particularly informed of these obser-vances may consult Maimonides, Leo of Modena, and Buxtorf.

The Egyptians, Phenicians, and Assyrians, neighbours to the Jews, had also their falls. The fall of the Ninivites, occasioned by the preaching of the prophet Jonas, is too well known to be insinuated. Nor were the Greeks without their fasts. Arriolote informs us, that the Lacedaemonians having resolved to succour a city of the allies, ordained a general fast through the whole extent of their dominions, without excepting the domestic animals; and this they did for two days, one that they might spare provision in favour of the besieged, and the other to draw the blessing of heaven on their enterprise. The Athenians, among others, observed the Eleusinian and Thesmophorian falls, the observance of which was accompanied with flacid fasting, particularly among the women, who spent one whole day sitting on the ground in a mournful dress, without taking any nourishment; on which account this day was called nefus.

In a word, all the Pagan deities, whether of the male or female sex, required this duty of those that desired to be initiated into their mysteries, of the priests and priestesses that gave the oracles, and of those that came to consult them.

In Italy fasting was observed much in the same way. The inhabitants of Tarentum, being besieged by the Romans, demanded succours from their neighbours. Reg-
on long fasting. Cyriacus Lentulus has composed one, "De Prodigiorum Facilitibus." Fortunius Liectus, professor of medicine at Padua, beholds a great many others, has published one book in folio, "De his qui vivunt sine Alimento," or "De Ferris Altrici Ama." Thorough fasting is not positively enjoined by Christ or his apostles, a practice prevailed among the first Christians of joining abstinence with their prayers, especially when they were engaged in affairs of extraordinary importance. But in the most ancient times we find no mention of any public and solemn fasts, except on the anniversary of Christ's crucifixion. However, in process of time, days of fasting were gradually introduced, first by custom, and afterwards by positive appointment; though it is not certain what those days were, nor whether they were observed in the first century. Mr. Mohlsim acknowledges, that those who affirm, that in the time of the apostles, or soon after, the fourth and fifth days of the week were observed as fasts, are not delirious of fancious arguments in favour of their opinion.

Toward the close of the third century fasting was held in much greater esteem, from a notion that it served as a security against the power of demons, who directed their stratagems principally against the luxurious. The Latins, contrary to the general custom, fasted the seventh day of the week; and as the Greeks and Orientals refused to follow their example, this afforded a new subject of contention between them. About the end of the fourth century this notion fell more generally prevalent; and fasting was also considered as the most effectual means of appeasing the anger of an offended deity. Hence proceeded the establishment of this practice as an indispensable duty, by express laws enacted by the rulers of the church. The Quadragesima or Lent fast was held more sacred than all the rest, though it was not yet confined to a certain number of days. But as fasting became more general, it was contrived to render it more easy; and therefore a more abstinence from flesh and wine was judged sufficient; which opinion prevailed from this time, and became universal among the Latins. lb. vol. i. p. 293-398.

The strict canonical fast only allows of one meal in twenty-four hours. F. Thomassin observes that the ancient fast was to fast without dinner, i.e. only to take one meal, and that not till after noon; adding, that to dine without supping, was a breach of the fast. The practice of the Latin church was to fast thirty-three days in the year; which was, as it were, the title of the year.

Tertullian wrote an express treatise, "De Jejunis," of fasts, to support the new laws of fasting, which the Montanists were for impugning.

The ancient catholics allowed of no obligatory or commanded fasts besides that preceding Easter, called Lent; the terms of which were to fasten eating till the evening.

The other fasts observed were only of devotion; such were the fourth and sixth fester; i.e. Wednesdays and Fridays.

This Lent fast was called plation. Besides these there were occasional fasts enjoined by the bishops, &c. See ABSTINENCE and LENT.

Some introduced the xerophagy into fasts; that is, the use of dried food for their meals; and made a practice of abstinence not only from all meats and wines, but also from succulent fruits, for the whole twenty-four hours; and some reduced themselves to bread and water: but this was more than commanded.

Vol. XIV.

FAST-days are those appointed by public authority, to be observed by fasting and humiliation. See ABSTINENCE. FAST-ground, or FAST-country, a term used by some of our Miners to express what others call the field; which see. FASTAGE, signifies the fough, fleet, or refuse small spar from a vessel.

FASTERMANS, or FASTING-MEN, q.d. homines h. bentes, was used in our ancient customs for men in repose and sublittance; or rather for pledges, securities, or bondsmanse, who, according to the Saxons polite, were fast bound to answer for one another's peaceable behaviour.

FASTI, in antiquity, the Roman calendar; wherein the several days of the year, with their feasts, games, and other ceremonies were expressed.

The Romans had their greater and lesser fasts. The great fasts were called the fasts of the magistrates; and the lesser, the fasti calendars.

The fasti calendars, which were what was properly and primarily called fasts, are defined by Fabius Pomponius to be books containing a description of the whole year; i.e. ephemerides, or diaries, distinguishing the several kinds of days, fas, profibus, feli, nefitis, &c. The author of these was Numa, who committed the care and direction of the fasti to the "pontifex maximus," whom the people used to go and conflict on every occasion. This custom held till the year of Rome 450, when C. Flavus, secretary to the pontifices, expelled in the forum a bill of all the days on which it was lawful to work; which was so acceptable to the people, that they made him consul while. Liv. lib. ix. cap. 46. Ed. Crevier, tom. i. p. 573.

These lesser fasti, or fasti calendars, were of two kinds, urban and rustic. The fasti urban, or fasti of the city, were those which obtained, or were observed in the city. Some will have them thus called because they were exposed publicly in divers parts of the city; though by the various inscriptions or graving thereof on antique stones one would imagine that private persons had them likewise in their houses. Ovid undertook to illustrate these fasti urban, and comment on them in his "Libri Fastorum," whereof we have the fix first books still remaining; the fix last, if ever they were written, being lost. Besides Ovid, several other authors had undertaken the same subject, particularly L. Cicero Asinutatus, Fulvius Nobilor, Maturinus Sahinius, Cornelius Labeo, C. Licinius; and Nillus; of all whom Macrobius makes mention in his "Saturn," and prefers fragments of each; besides a work of one Erbini Marcus, intitled, "De Falsis Diebus," quoted by Pulgensius, "De Prisco Sermones." In the greater fasti, or fasti of the magistrates, were expressed the several feasts, with every thing relating to the gods, religion, and the magistrates; the emperors, their birth-days, offices, days consecrated to them, and feasts and ceremonies established in their honour, or for their prosperity, &c.

With a number of such circumstances did fast and length swell the fasti, when they became denominated magni, to distinguish them from the bare calendar, or fasti calendars.

In the fasti rusticci, or country fasts, were expressed the several days, feasts, &c. to be observed by the country people; for as these were taken up in tillage the ground, fewer feasts, sacrifices, ceremonies, and holidays, were enjoined them than the inhabitants of cities; and they had also some peculiar ones not observed at Rome.

These rustic fasti contained little more than the ceremonies of the calendae, nones, and ides; the fasts, ages of the zodiac, increase and decrease of the days, the twelveth gods
of each month, and certain directions for rural works to be performed each month.

FAS was also a chronicle or register of time, wherein the several years were denoted by the respective consuls, with the principal events that happened during their consulates; these were called also fasti consulares or consulari fasti.

Omphanius Pannius, Pigitta, Signiunus, and Jansen d'Almeleoven, have given us the fasti consulares; the two first, with long and learned comments, wherein are expressed not only the consuls, but also the Dictators, magistri equitum, triumphs, and ovations. Piggins even adds as many of the officers as he could find, viz. praetors, tribunes, &c. J. d'Almeleoven confines himself to the consul alone.

FASI is full applied to the archives and public records wherein are kept historical memoirs of public and remarkable events that have happened to a people.

In the like sense the martyrology is called the sacred fasti of the church.

The Defunct Du-Londel has compiled the fasti of Louis le Grand, &c.

FASI, or Dirs Fasli, also denoted court days. See Day.

The word fasti, fastorum, is of the formed of the verb fasto, to speak, because, during those days the courts were open, causes might be heard, and the praetor was allowed fasti, to pronounce the three words, de, dico, addico; the other days wherein this was prohibited were called nefaslii: thus Ovid,

"Ile nefasli et quper quem tria verba filentur: Fasli et quper quem legere habitat agi."

These dies fasti were noted in the calendar by the letter F: but observe, that there were some days ex parte fasti, partly fasti, partly nefasii; i.e. justice might be distributed at certain times of the day, and not at others. These days were called intercali: they were marked in the calendar thus: F.P. fastus primo, where justice might be demanded during the first part of that day.

FASIGIATI Furni, in Chemistry, furnaces fitted with several sluices.

FASIGIUM, in Architecture, the same with pediment.

FASTING Men. See FASTERMANS.

FASINEL, in Geography, the name of a rock in the Atlantic ocean, not far from Cape Clear, on the southern coast of Ireland. N. lat. 51° 17'. W. long. 9° 30'.

FASCOLFF, John, in Biography, knight and knight-banneter, a renowned general, governor and nobleman in France during our conquests in that kingdom, under Henry IV. V. and VI. of England, was son of John Falloff, eq. of Yarmouth, and of Mary, daughter of Nicholas Park, eq. and born, it is presumed, about the year 1577. He is supposed to have had a good education, and his father dying while he was young, he became ward to John duke of Bedford, who was afterwards regent of France. The first public employments in which Falloff was engaged seem to have been under Thomas of Lancaster, afterwards duke of Clarence, the then lord-lieutenant of Ireland, which was in 1501, and it is probable he was with him again in that country in 1505, 6, and 8, as in the beginning of 1509 he was married in that kingdom to a rich young widow of quality, named Millicent, lady Castlecomb, relict of sir Stephen Scope. The marriage was solemnized on the feast of St. Hilary, and Falloff obliged himself in a bond of 1000l. to pay her an hundred pounds a-year in

the nature of pin-money during her life. There seems good evidence that shortly after his marriage he went to France, where he was, according to the testimony of Caxton, full forty years, so that he could not have been a companion with, or follower and corrupter of prince Henry; of course Shakespeare could not have drawn his sir John Falloff from this gentleman: "The one," says the writer of the article in the Biographia Britannica, "is an old humourous, vapouring, and cowardly, lewd, lying, and drunken debauchee, about the prince's court, when the other was a young and grave, discreet and valiant, chaste and sober commander abroad, continually advanced to honour and places of profit, for his brave and political achievements, military and civil; continually preferred to the truth of one government or other, of countries, cities, towns, &c. as a general and commander of armies, in martial expeditions while abroad, made knight-banneter in the field of battle; baron of France, and knight of the garter in England," &c. &c. In the year 1415 Falloff had the castle and dominion of Bevers in Gascony committed to his custody and defence. He was afterwards engaged in the celebrated battle of Agincourt, in which it is said, he signalized himself by taking the duke d'Alencourt prisoner. For his eminent services in this and other great battles he received the honour of knighthood, and the manor and demesnes of Fitzene, near Harfleur, bellowed upon him during life. For various other influences of high military prowess he was elected, about the year 1425, knight of the garter. In October 1428 Sir John Falloff with others were dispatched with supplies to the English army who were besieging Orleans: two immense French armies were sent to prevent the succours being delivered; these, by the valour of sir John, were defeated, and he accomplished the task for which he was sent without difficulty. This circumstance has been celebrated as almost unparalleled in history. After fresh victories, and much active service in France, where many years he had the government of Normandy, he returned to his native home, and though living in retirement he was a zealous friend of those to whom he could be serviceable. He died in the year 1459 or 60, and was buried in a chapel of the abbey church of St. Bennet in Norwich; so highly was he venerated, that John Beauchamp, lord of Powke, appointed by his will a chaut for the soul of Sir John Falloff. Biog. Brit.

FAT, in Anatomy. See Cellular Substance.

FAT, Animal. For the chemical properties of this substance, see the articles Oil, animal, and Sebacic acid. See also Adeps.

The way of preparing fat for medicinal purposes is to take out the skins, veins, fibres, &c. wash it till it becomes unbloody; then melt it by a gentle heat, with a little water, till the water is evaporated; strain, put it into an earthen vessel where it will fix, and preserve it from air.

FAT of Whale. See Blubber.

FAT, in Agriculture, is a term which is frequently applied to such neat cattle and sleek flock as are ready for the butcher.

FAT, in Rural Economy, is a term which is often applied to the large wooden vessels in which various sorts of liquors are contained, while they undergo the state of preparation, as ale, beer, cyder, &c. It is, however, more frequently written vat. See VAT.

And it likewise signifies, with brewers and maltsters, the large wooden vessel which, for expedition, is employed to measure malt, and which contains one quarter, or eight

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bushels.
buffets, according to statutes 1 Hen. V. cap. 10, and 11 Hen. vi. cap. 8.

It is also applied to a vessel or pan of lead, which is made use of in the preparation of salt. See SALT.

FAT also denotes an uncertain measure of capacity: thus, a fat of flinglass contains from 3½ hundred weight to 4 hundred weight; a fat of unbound books half a man, or 4 barrels; of bristles, 5 hundred weight; of wire, from 20 to 25 hundred weight; and of yarn, from 22 to 22½ bundles.

FAT-Hen. in Rural Economy, is a term often provincially used to signify the weed called goose-foot.

FATA MORGANA, or the Ghost of the Fairy Morgana, the common appellation of a figular phenomenon, which is sometimes seen in the Faro of Melissa, and fratrists of Reggio, between the island of Sicily and the coast of Calabria. The origin of this appellation is doubtful, or rather unknown; yet some authors are pleased to derive it from μόργανα, melancholy, and γαίες, inducing exhilaration; alluding to the pleasure which its appearance gives to the speculator; for whoever has been an eye-witness of this phenomenon, expresses himself as having been highly delighted by it.

This phenomenon has been noticed and described by various authors: viz. Kircher, Angluesi, Scotta, Giardina, Gallo, Leanti, Minafi, Brydone Swinhurst, and others; but of all these authors, Fr. Antonio Minafi, who had thrice been spectator of this remarkable appearance, seems to describe it in a more explicit manner. His dissertation on the subject was published at Rome in the year 1793.

The north-east angle of the island of Sicily comes very near the southern extremity of the kingdom of Naples. The channel between these coasts is narrow, and confined between two ridges of mountains. In this channel the water is continually agitated, and thrown into ridges and whirlings by the violence of the current, by the particular direction of certain winds, and by the irregular conformation of the coasts. At times it likewise happens that a very dense vapour is accumulated, and condensed over the water of the channel. "When," Minafi says, "the rising sun shines from that point whence its incident ray forms an angle of about 45 degrees on the sea of Reggio, and the bright surface of the water in the bay is not disturbed either by the wind or the current, the speculator being placed on an eminence of the city, with his back to the sun, and his face to the sea; on a sudden there appears in the water, as in a catoptric theatre, various multiplied objects; viz. numberless serpents, pachyderms, conchae, sulphur, lilies, arches, columns, cornices, towers, chambers, palaces, fields, mountains, trees, and many other strange figures, in their natural colours and proper actions, passing rapidly in succequence along the surface of the sea, during the whole of the hour period of time while the above-mentioned caustics remain."

But if, in addition to the circumstances before described, the atmosphere be highly impregnated with vapour, and dense exhalations not previously dispersed by the action of the wind or waves, or rarefied by the sun, it then happens that in this vapour, as in a curtain extended along the channel to the height of about four or five and twenty feet, and nearly drawn to the sea, the observer will behold the scene of the same objects not only reflected from the surface of the sea, but likewise in the air, though not so distinct or well defined as the former objects from the sea.

"Last, if the air be slightly icy and opaque, and at the same time dewy, and adapted to form the iris, then the above-mentioned objects will appear only at the surface of the sea, as in the first case, but all vividly coloured, or fringed with red, green, blue, and other prismatic colours."

These appearances induced this author to distinguish the phenomenon into three species under distinct denominations; viz. calling the appariition on the water by the name of marine morgana; that in the air by the name of aerial morgana; and that which is attended with fringes of colour, the prismatic morgana.

This description of the phenomenon coincides upon the whole with other accounts, so far at least as to the appearance of something extraordinary on the surface of the sea, or in the air, vapour, fog, &c., not much above the surface of the water; but when the minutest particulars are inquired into, then all the accounts differ considerably from each other. In truth, the phenomenon is always different, transient, and surprising; and it is no wonder that the accounts should be found to differ. The imagination, which readily supplies the imperfect perceptions of the senses, may doubtless influence considerably the correctness of the accounts. The objects which are described as appearing perfect and well defined by some, are said to be extremely indistinct and indefinite by others; yet all seem to coincide in saying that figures of human beings and of other terrestrial objects are admitted in the fata morgana; thus Leanti says that the sky appears crowded with a variety of beautiful objects, such as palaces, woods, gardens, vessels, and such like, together with figures of human beings, and other animals, that appear to move amongst these fixed objects.

Notwithstanding the disagrement of the accounts with respect to particulars, the appearance of the phenomenon, which has been observed by a vast number of creditable authors, ancient as well as modern, cannot possibly be doubted; hence philosophers have endeavoured to account for it upon the known laws of optics, and of other natural powers; but notwithstanding their exertions, a thorough explanation of the appearance still remains a desideratum. In his attempts to explain this phenomenon, Minafi first describes the city of Reggio on the coast of Calabria, opposite to Melissa, together with the adjacent parts, and then endeavours to prove that all the objects which are seen in the fata morgana are the representations of those objects which stand on the coast. He says, "that the sea in the frarants of Melissa has the appearance of a large inclined speculum, that in the alternate current or tide which flows and returns in the frarants for six hours each way, and is constantly attended by an opposite current along the shore to the medium distance of about a mile and a half, there are many eddies and irregularities at the time of its change of direction; and that the morgana usually appears at this period."

After various other considerations he at last accounts for the appearances, by the supposed inclination of the surface of the sea, and its sub-division into different plains by the contrary eddies. He explains the aerial morgana by referring it to the reflective and refractive powers of effufion suspended in the air.

Mr. Bredeney, in his tour through Sicily and Malta, speaking of the attempts that have been made for explaining the phenomena of the fata morgana, says, "they think it may be owing to some uncommon refraction or reflection of the rays, from the water of the frarants; which, as it is at that time carried about in a variety of eddies, and vortexes, must of consequence, if they make a variety of appearances on any medium where it is reflected. This, I think, is nonsense; or at least very near it. I suspect it is something in the nature of our aurora borealis; and, like many of the great phenomena of nature, depends upon electric causes; which,
FAT

which, in future ages, I have little doubt will be found to be as powerful an agent in regulating the universe, as gravity is in this age, or as the subtle fluid was in the last.

We shall briefly present our readers with a statement of the conjectures which Mr. Nicholson was enabled to derive from an examination of the accounts, observations, &c. “It seems,” he says, “that, by the situation of the Faro of Meffina, the current from the south, at the expiration of which phenomenon is most likely to appear, is so far impeded by the figure of the land, that a considerable portion of the water returns along shore. 2. That it is probable the same coasts may have a tendency to modify the lower portion of the air in a similar manner, during the southerly breeze; or, in other words, that a sort of bacino is formed by the land, in which the lower air is more disposed to become motionless and calm than elsewhere. 3. That the morgana marine presents inverted images below the real objects, which are multiplied laterally, as well as vertically; and that there are repetitions of the same multiplied objects at more considerable vertical intervals. 4. That the aerial morgana is not inverted, but, as I am disposed to conjecture, is more elevated than the original objects. 5. That the fringes of prismatic colours are produced in falling vapours, similar to many appearances which have been described by authors, but not accurately explained by the general principles of refraction through spheres of water. The ship is referred to by Minafi as an object surrounded by these fringes, whence it appears that the colours apply to the direct rays from objects, as well as to those of the marine morgana. 6. The various other objects in the description afford matter for question and conjecture; but none perhaps it may be proper to enlarge upon, until the theory be better known. 7. It seems, at all events, more probable that these appearances are produced by a calm sea, on one or more strata of super-incumbent air, differing in refractive, and consequent reflectible power, than from any considerable change in the surface of the water, with the laws of which we are much better acquainted than with those of the atmosphere. 8. By attentive reflection upon the facts and reasonings in Mr. Hud- dart’s paper, (Phil. Trans. for 1797,) we may form a theory to account for the erect and inverted images: the polished surface of the sea may perhaps account for the vertical reflection; but for the lateral multiplications we must have recourse to reflecting or refracting planes in the vapour, which appear nearly as difficult to define or establish, as those which have been hitherto on water.” Phil. Journal for August, 1797.

FATAGAR, in Geography, a country of Africa, situated to the south-call of Abyssinia; about N. lat. 9°. E. long. 39°.

FATATINDA, a town of Africa, in the country of Woolly, on the river Gambia, about 500 miles from its mouth, where the English had a factory, but were compelled to abandon it in the year 1734, by the conduct of the king of Tomani; 17 miles S. of Medina. N. lat. 15° 20'. W. long. 13° 8'.

FATE, Fatum, in a general sense, denotes an inevitable necessity depending on some superior cause.

Fate is a term much used among the ancient philosophers. It is formed from *fatu*, from *speaking*, and primarily implies the same with *fatum*, viz., a word or decree pronounced by God; or a fixed sentence, whereby the Deity has prescribed the order of things, and allotted every person what shall befal him.

The Greeks call it *μακερός*, *μακάμος*, *νέας*, *νέα*, a chain, necessary series of things indifferently linked together.

All things, says Plato, are in fate; *i.e.* within its sphere or scheme, but all things are not fated; and he thus explains the distinction: it is not in fate, says he, that one man shall do so and so, and another suffer so and so, for that would be destructive of our free agency and liberty; but if any one should choose such a life, and do such or such things, then it is in fate that such things and such consequences shall ensue upon it. The soul, therefore, is *αμερτόν*, free and uncontrolled, and it lies within itself to act or not; and there is no compulsion or necessity here; but what follows upon the action shall be accomplished, *συνυπαγόμενον*, according to fate, or the constitution of things; *e.g.* that Paris should hear off Helen by force was something dependent on himself; but that a war should ensue is the consequence. Ex. Alcino de Platon. Dogmat.

The same philosopher, as cited by Herocles, observes to this purpose: the choice of action is in our own power; but the just award or retribution of good or ill which ensues upon the choice, lies in the hand of those ethereal judges who are appointed under God.

But beside this sense of the word wherein it is used, sometimes to denote the connection of causes in nature, and sometimes in the divine appointment, the word fate has a farther intention, being used to express a certain necessity or external designation of things, whereby all agents, both necessary and voluntary, are laxed and directed to their ends.

See Necessity.

Some authors divide fate into astrological and focial. FATE, Astrallogical, denotes a necessity of things and events, arising, as it is supposed, from the influence and positions of the heavenly bodies, which give law both to the elements and mixed bodies, and to the wills of men.

In which sense the word is often used by Manlius, "Certum est & inevitable fatum: materiæque datum eit cogi, sed cogere tollere."

FATE, Stoical, or fatality, is defined by Cicero an order or series of causes, wherein cause being linked to cause, each produces the other; and thus all things flow from one prime cause. Chrylippus defines it a natural invariable succession of all things *ab eterno*, each involving the other. The Stoic idea of providence is, that of an infinitely wise and good being, wholly independent of matter, freely directing and governing all things, but that of a necessary chain of causes and effects, arising from the action of a power, which is itself a part of the machine regulated by it, and which, equally with that machine, is subject to the immutable law of necessity. Hence, it appears, that providence, in the Stoic creed, is only another name for absolute necessity or fate, to which God and matter, or the universe which consists of both, is immutably subject. Thus the poet: the Parent of all things made laws at the beginning, by which he not only binds other things but himself. So Seneca: "Eadem necessitas & deos alligat. Irreverchus divina pariter & humana curvis velit. Ipsi ille omnium conditor & rector scriptur quidem fatas, fadoque sequitur: femel scriptur, semper pareat." (See STOICS.) The doctrine of the Stoics concerning fate, was strenuously opposed by Carneades. See CARNEADES.

The eternal series of causes mentioned by the Stoics the poets call *Magna* and * Parsc*, or *Deinamis*. Fate is divided by some later authors into *physical* and *divine*.

FATE, Physical, is an order and series of natural causes appropriated to their effects. This series is necessary, and the necessity is natural. The
principle or foundation of this fate is nature, or the power and manner of acting which God originally gave to the several bodies, elements, mixts, &c. By this fate it is that fire warms, bodies communicate motion to each other, the sun and moon occasion the tides, &c. and the effects of this fate are all the events and phenomena in the universe, except such as arise from the human will. See Nature.

**Fate, Divine,** is what we more usually call Providence. Plato in his Phædo includes both these in one definition, as intimating, that they were one and the same thing, actively and passively considered. Thus, "Fatum est ratio quaedam divina, lexque nature num, quæ transferri nequeat, quippe a causis, quæ superior sit quibus vis impedimenta." Though that of Boethius seems the clearer and more just, "Fatum," says he, "est inherens rebus mobilibus dispositionem, per quam Providentia suis quaerit necit ordinibus."

**FATED, in Geography,** a town of Russia, and district of the government of Kurf. on a rivulet falling into the Svopa.

**FATHER, Parent,** a term of relation, denoting a person who begot a child, either male or female.

Among the ancient Romans the fathers of three children had very considerable privileges allowed them as such. By the law of Romulus a father had an absolute and unlimited power over his children. Amongst the Lacedaemonians, as we learn from Aristotle's Politics, the father of three children was exempted from the duty of mounting guard for the security of the city; and a father of four children was exempted from every public burden. Concerning the duties and claims of fathers and mothers; see Parent.

**Father, Adoptive,** is he who takes the children of some other and acknowledges them as his own. See Adoption.

**Father, Patrificant,** is he who is only the reposed or supposed father. Joseph was putative father of our Saviour.

**Father, Natural,** is he who has illegitimate children.

**Father-in-Law,** is a person married to a woman who has children by a former husband, &c. to which children he is said to be a father-in-law.

**Father is also used in Theology for the first Person in the Trinity.**

**Father is also used in a figurative sense on divers moral and spiritual occasions.** Thus, it is applied to the patriarchs; as we say Adam was the father of all mankind, Abraham the father of the faithful, &c.

**Fathers, Apostolical.** See Apostolical.

**Fathers, in an Ecclesiastical Sense,** denote the ancient prelates and doctors of the church.

The fathers assembled at the council of Nice: Chrysofom, St. Basil, &c. were Greek fathers, and St. Augustin, St. Ambrose, &c. were Latin fathers.

The appellation of fathers is usually confined to the theological writers of the first five centuries.

Learned men have differed in their opinion concerning the degree of esteem that is due to the ancient fathers, more especially as moral writers. Whilst some represent them as the most excellent guides in the paths of piety and virtue; others place them in the very lowest rank of moralists, considering them as the very worst of all instructors, and treat their precepts and decisions as perfectly infipid, and, in many respects, pernicious. Although we allow that in the writings of the primitive fathers there are several sublime sentiments, judicious thoughts, and many things that are naturally adapted to form a religious temper and virtuous character; yet it must be confessed that they abound still more with precepts of an unreasonable and exiguous austerity, with fiscial and academical dictates, vague and indeterminate notions, and what is still worse, with decisions that are absolutely false, and in evident opposition to the precepts of Christ. In later ages, and particularly towards the close of the eighth century, the labours and writings of the fathers were totally employed in collecting the opinions and authorities of the fathers, i.e. the theological writers of the first six centuries; and so blind and servile was their veneration for these doctors, that they regarded their dictates as infallible, and their writings as the boundaries of truth, beyond which reason was not permitted to extend its researches. The Irish, or Hibernians, who in the eighth century were known by the name of Scots, were the only divines who refused to disfigure their reason by submitting it implicitly to the dictates of authority. Naturally subtle and pragmatic, they applied their philosophy, such as it was, to the illustration of the truth and doctrines of religion: a method which was almost generally abhorred and exploded in all other nations. It is much to be lamented, that the fathers of the Christian church soon departed from the simplicity of the apostolic age, and corrupted the purity of the Christian faith. This is chiefly to be ascribed to the following causes; viz. first, the practice which at that time so generally prevailed of clothing the doctrines of religion in an allegorical dres; and, secondly, the habit of subtle speculation, which the most learned converts from Paganism brought with them from the schools of philosophy. The practice of allegorical interpretation prevailed in a very great degree among the Gentile converts, who had been educated in the Alexandrian schools, and among those Jewish Christians who, by the fame help of allegory, had been instructed in the Caballistic doctrines, which before this time had sprung up in Egypt, and fallen thence into Judæa. Several of those sects of Christians, who were called Heretics, particularly the Valentinian Gnostics, made use of allegorical language to diffuse the unnatural alliance which they had introduced between the fanatical dogmas of the Oriental philosophy, and the simple doctrine of Christ. The orthodox fathers of the church, too, defended themselves with the same armour both against heretics and infidels; applying with more ingenuity than judgment the symbolical method of interpretation to the sacred scriptures. In the same manner in which Philo and other Alexandrian Jews had corrupted the Jewish church, Clemens Alexandrinus, Origen, and other disciples of the Alexandrian school, in the second century, introduced error and corruption into the church of Christ. Among the Christian fathers, who had abandoned Paganism on account of its inferiority to the doctrine of Christianity, there were not wanting advocates for different sects of Grecian philosophy. When Origen and his followers, together with many others, favoured the Eclectic method of philosophising, which had been followed in the Alexandrian schools, they easily persuaded themselves that, as a coalition had been effected in these schools between Plato and Aristotle, it would not be difficult to accomplish a similar coalition between Jesus Christ and Aristotle. Others reasoned in the same manner with respect to the doctrines of the Stoics. The Epicurean was almost the only sect which met with no patrons among the Christian fathers. But the sect which obtained most favour in the Christian school was the Platonic. See Platonic.

It should be readily acknowledged, that the early teachers of the Christian church were honest and zealous advocates for the cause of Christ; and that many of their apologies discover an extensive acquaintance with ancient philosophy and learning, and serve to call much light upon the philosophical
The Christian Fathers, from the beginning of the second to the
seventh century, may be divided into two classes: those
who flourished before, and those who flourished after, the
institution of the Eclectic system. The first class commences
with Julian the Martyr; the second with Origen. The apo-
tactic fathers, who had derived their knowledge of Chris-
tianity, and their habits of thinking, from the apocryphal
and other early writings, few traces of the Grecian or Alex-
andrian philosophy. But, when men who had been educated in the
Gnostic schools became converts to the Christian faith, they brought
with them their philosophical ideas and language, and associated them
with the doctrine of Chriatianity. Among these Christian
philosophers, the first, and most celebrated, was Justin Mar-
ty, who blended Platonie notions and language with the
simple doctrine of Christianity, and wrote concerning God
and divine things like a Christian Platonist. Tatian was
his disciple; and his apology for Chriatianity, entitled,
"Oratio ad Graecos," every where breathes the spirit of
the Oriental philosophy, and the whole tenor of it concur
with his history to prove, that he was a Platonic Christian.
We may also rank among the Platonizing fathers Theoph-
olus of Antioch, Athenagoras, Irenaeus, Tertullian, and
Clemens Alexander. To these we may add, among
those who flourished after the establishment of the
Eclectic system, Origen, Anatolius of Alexandria, Arnobius,
Eusebius Pamphilus, Dalmusus of Alexandria, Angulius,
Syntaxes, an African bishop, and others, who chiefly flour-
rished in the eastern countries. In the western world ap-
peared Claudianus Mamertinus, Boethius, Aeneas Gaza,
Zacharias, Philoponus, and Nemesius. See Brucker's Hist.
of Phil. by Enfield, vol. ii.

Father is also a title of honour given to prelates and
dignitaries of the church. The right reverend father in
God, lord Bishop of, &c. "Ab cura simulitudine patres
appellatur."

Father is also applied to the superiors of convents,
&c. (See Abbot.) The father-general; father-provincial,
ex-provincial; father prior, sub-prior; father definator,
in the order of Benedictines; father guardian, in that of
the Franciscan; father correcor, among the Minims, &c.

Fathers is also applied plurally to all congregations of
edicaries, whether regular or secular; as the fathers
Cordeliers, Capuchins, Augustins, Jacobins, &c. The
fathers Defuits, fathers of the Oratory, Barnabites, Thea-
tists of the Mission, &c. See each under the proper ar-
ticle.

Fathers of the Christian Doctrine is a denomination
belonging to two religious orders: one instituted in France
by Cesar de Bus, and confirmed in 1597 by Clement VIII.
and another in Italy founded by Cufani, a Milanese
knight, and established by the authority of Pius V. and
Gregory XIII.

Fathers of Soma, or regular clerics of St. Maeluis, is
the designation of a religious order deduced from the name
of the place where their founder resided. It was first
formed into a distinct society by Jerome Emiliani, a noble
Venetian, and confirmed by Paul III. and Pius IV. in
1540 and 1556. Their office was the instruction of the
young and ignorant, and the relief of orphans.

Fathers is also used for persons venerable for their age
or quality, or the services they have done the public.

Thus,
Thus, at Rome the senators were called confessi sacerdos, patres conscripsi, &c.

Father Loffler, in Ichthyology, an English name given to a fish, called by some authors, though improperly, scopus, and scorpius marinus. It is properly of the cotto kind. See COTTUS SCORPIUS.

FATHIMITES, or FATHEMITES, the descendants of Mahomet by Fatima, or Fatemah his daughter.

The dynasty of Fathimites, i.e. of princes descendent in a direct line from Ali and Fatima his wife, Mahomet's daughter, commenced in Africa, in the year of the Hegira 296, of Jesus Christ 908.

The Fathimites afterwards conquered Egypt, and established themselves therein in quality of caliphs.

The Fathimites of Egypt ended with Abd el in the year of the Hegira 567, 288 years after their first establishment in Africa, and 8 years after the conquest of Egypt.

FATHOM, in Rural Economy, is a long measure, which comprises six feet, being taken from the utmost extent of both arms, when fully stretched out into a right line. It is made use of in the measurements of mines, quarries, wells, and pits.

This measure is chiefly used at sea, or by seafaring people, for expressing depths of the sea, lengths of cables, &c. It is hardly ever used on land, except sometimes by miners.

The length of the fathom formerly differed a little, according as it was used on vessels of greater or less size. Thus in the old edition of Chambers's dictionary, the following explanation is given: "There are three kinds of fathom accommodated to the different ranks of vessels. The first, which is that of men of war, contains six feet. The middling, or that of merchant ships, five feet and a half; and the small one, used by fly-boats, and other fishing vessels, only five feet."

At present, however, the measure of a fathom is universally considered as being equal to six feet exactly.

FATHOM is also used in several countries, particularly Italy, for the common yard or ell, whereby things are ordinarily measured in commerce.

In this sense it is more commonly called brace or braccio, or d. arm. In Maffeo the fathom contains seven English feet, and about one-tenth of an inch.

FATHOM TALE, in Arabic, is a term for work, let to workmen by the fathom measure in length, as the driving of foughs and levels generally is.

FATHOM is a measure equal to two yards, or six feet in length, in general corresponding with the French toire, whereby the scale of military measures in that country is generally regulated. The French foot being nine lines, or about $\frac{1}{3}$ parts longer than the English, requires, that in estimating the fortifications, and other buildings, &c. of that quarter, we should in general terms make an allowance of about one foot in fifteen and a half, for an excess on their part. Therefore, when we say that the line of defence of a French fortress measures 155 toises French, it will, according to our scale, give full 105 British fathoms, such as are commonly used throughout our marine. This measure has given rise to a term now perfectly familiar among us, namely, "to fathom the depth of water," &c.; meaning, to ascertain how many fathoms it may measure from the surface to the bottom. We have likewise a derivative expression, whereby the word fathom is applied metaphorically: thus, we say, there is no fathoming that fellow's thoughts! meaning, that he is too deep for us to get to the bottom of his designs.

FATIABAD, in Geography, a town of Hindoostan, in the soukah of Agra, built in 1641 by Modoud, king of Ghizini; 15 miles S.S.E. of Agra.—Also, a town of Hindoostan, in the ceeear of Hisfar; 57 miles W. of Hisfar.

FATTAH, a town of the Arabus, in the Euphrates; 15 miles S.W. of Kurna.

FATT ESS, in Medicine. See Corpulency.

FATO, in Geography, a small isle on the east side of the gulf of Bothnia. N. lat. 63 52'. E. long. 22 44'.

FATTSIJO, an isle of Japan, about 87 miles from the south coast of the isle of Nipgon, whither the emperor besought the grandees who have officiated him, to be employed in making silk stuff embroidered with gold. The isle is barren, and almost inaccessible. N. lat. 33 40'. E. long. 110 10'.

FATTALAGUNGE, a town of Hindoostan, in Oude; 20 m. 1/4 S.E. of Sumbul.

FATTAPOUR, a town of Hindoostan, in Oude; eight miles W. of Karabad.

FATTECONDA, a town of Africa, in Bornou. N. lat. 14 20'. W. long. 12 20'.

FATTENING, in Rural Economy, the art or process of rendering any sort of animal fat, or fit for food. It is a busines in which much care and circumpection are requisite, as well as considerable knowledge of the nature of animals. FATTENING of Cattle, the means of preparing them for the purpose of the butcher. It is a process which is capable of being accomplished in several different methods, but the most usual is that of grazing them in rich feeding pastures. It is likewise effected by keeping them in warm convenient houses, or sheds, and feeding them regularly with oats and other sorts of grain, either ground or in the sheaf; different kinds of roots, as common and Swedish turnips, carrots, parsnips, potatoes, &c. with some sort of dry food, and by the use of oil cake in the same manner. These modes are termed stall-feeding, from the animals being kept up in the stalls; and there is much advantage in keeping the houfes properly dry and warm, and the troughs for the food perfectly clean and sweet. It is also essential that the food should be given them in a regular manner, in suitable proportions, and properly varied, where different sorts are employed. See STALL-feeding.

This applies equally to cattle, sheep; but the fattening of early lambs, and of calves, is mostly accomplished by the flocking of them. See Calf-Suckling, and House-Lamb Suckling.

FATTENING of Colours, among Painters, denotes a coagulation of the oil, which, in quantity happens on its being mixed with several kinds of pigments; whence, after being kept for some time, it is rendered of no vifue or glutinous a consistence, so as to be wholly incapable of being worked with either brush or pencil. This also happens sometimes after the colours have been spread or laid on the proper ground: in which case, one part of the oil will run off in small streams or drops, while the other will remain with the colour, without the least tendency to dry. Oils likewise will happen by long keeping, or by being exposed for a considerable time to the sun and air.

FATTENING of Horses. See Horses.

FATTIK, in Geography, a town of Africa, and capital of the kingdom of Joshi. N. lat. 14 1/2. E. long. 16 45'.

FATTIKO, a town of Africa, in the kingdom of Jemarow.

FATTIPOUR, or FATEPOUR, a town of Hindoostan, in the soukah of Agra, anciently called "Sikari," but on being rebuilt by Asbar changed its name. It was once a magnificent city, but is now in a state of decay: 28 miles W. S. W. of Agra. N. lat. 27° 10'. E. long. 78° 38'.

Alfa, a town of Hindoostan, in Oude; 35 miles W.S.W.
of Lucknow.—Alfo, a town of Hindooef, in the cir-er of Nagore; 25 miles N.W. of Didwana.—Alfo, a town of Hindooef, in Bahar, on the Gondee; 30 miles N.W. of Patna.

FATTO-KAN-DURGA, a town of Hindooef, in Moultan; 35 miles N.W. of Moultan.

FATUARI, in Antiquity, were persons who, appearing inspired, foretold things to come.

The word is formed of Fatna, wife of the god Fatnas, who was supposed to inspire women with the knowledge of futurity, as famous himself did the men. Fatna had her name from fari, q. d. vaticinari, to prophesy.

FATIUS IGNIS. See Ignis Fatuus.

FAVAGNA, or FAVAGNA, in Geography, an isle in the Mediterranean, about 7 miles in circumference, near the W. coast of Sicily; anciently called Aegina, or Ca- prea.

It has good anchorage in a convenient harbour, and some years yields from its fisheries 82,000 livres. N. Lat. 38° E. long. 12° 25′.

FAVALLI, in Biography, an Italian singer, with a fop- prano voice. He seems to have been the first singer of that country and kind who made any impression on French ears.

He was so beloved by Louis XIV. for his fine voice, and the pleasure which his style of singing gave that monarch, that he permitted him to float in the royal manors, and even in the park at Versailles.

He first arrived in France in 1674, and his powers seem to have been miraculous.

FAVANT, LA, in Geography, a river of Naples, which runs into the sea, 9 miles S.E. of Squillace.

FAVARA, a river of Sicily, which runs into the Medi-terranean, about 5 miles S. of Modica.—Alfo, a town of Africa, in the country of Barca; 50 miles E.S.E. of Derna.—Alfo, a town of Sicily, in the valley of Noto, on a river of the same name; 10 miles W. of Noto.

FAVAROTA, a town of Sicily, in the valley of Mazara; 15 miles W.N.W. of Palermo.

FAVART, Charles Simon, in Biography, one of the most agreeable and pleasing lyric French poets of the last century. He was born at Paris in 1710, educated in the Jesuits' college, and gave early evidence of a happy disposition for French versification.

At twenty years of age he composed a poem on the Floraal games, and was crowned. Many beautiful iambics of his writing were already in circulation.

Upon the merits of these juvenile pieces he was engaged at the comic opera. "La Chercheux d'Elpitr, or Nic- cette in search of Wit," which had been preceded by many other comic operas, was so favourably received, as to fix his reputation. His "Chercheux d'Elpitr" being regarded as a master-piece in its kind, the royal academy of music, or the great opera, claimed his talents, and he produced for that theatre the ballet of "Don Quixot." (See Ballet.)

In 1744 he married the daughter of a musician in the band of Stanislaus, king of Poland, Juliana de Ronsereul, who by a condolent succession was one of the principal supports of the comic opera. Her talents of different kinds, acting, singing, playing on the harp, and dancing, all by turns, he exhibited with equal grace and perfection. We saw her in the part of Roxalana in the "Three Sultans," at near 60, act, look, sing, romp and dance (with her petit nez rentrôff), with as much seeming vivacity as if she had been only 16.

Her various estimable talents and conduct justified the choice of an author so eminent for the delicacy of his taste as the decorum and propriety of his manners. He formalized his zeal on every interesting occasion for his country, and was employed by the court at different festivals, and honoured with the title of master of the revels, with a pension of 1200 livres.

At the peace of 1762 he wrote, by order of the government, a piece of one act, for the theatre Francois, called "L'Anglois a Bourdeaux!" and the celebrated Madame D'Angerville, who had quitted the stage, returned to play the principal part. The success of this work was crowned by his being presented to the king, who conferred on him another pension.

Men of letters doted on the "Englishmen at Bourdeaux" the agreeable author of "Ninette a la Cour," and the "Three Sultans," and regretted that theatrical etiquette forced him to lavish on the Italian stage talents worthy of the French. The commissiofiers have never been too unjust to attribute to him the works of others, particularly as he has always with scrupulous delicacy informed the public of any affability he might have received from his intimate friends.

He was the first who tried to teach us to listen to Italian music. In adapting it to French words, Philiber assisted him, and they succeeded. The purity and elegance of his style, with the gaiety of his sentiments, are the principal characteristics of this amiable author." Labord.

FAUCHET, Claude, was born at Paris about the year 1529. He was made president of the "Cour des Monnaies," an office which he was obliged to fall to pay his debts. From Henry IV. he obtained a pension, with the title of hisloigrapher. He was an able antiquarian, and well versed in all books relating to the subject, making himself some important additions to the stock.

He died in 1641, leaving behind him (1) "Antiquities Galoises et Françoises," in two parts: the first brings down the history of Gaul to the arrival of the Franks: the second from Pharamond to Hugh Capet. (2) "A Treatise on the Liberties of the Gallican Church." (3) "A Treatise on the Origin of Knights, Coats of Arms, and Heralds." (4) "Origin of the Dignities and Magistrates of France." His works were collected and published in 4to, at Paris in 1610. More.

FAUCIGNY, or FAUSSIGNY, Barony of, in Geogra-phy, a province of Savoy, bounded on the N. by the territory of Chablais, on the E. by the Valais, and the duchy of Aosta, and on the S. and W. by the Genevois. Wood and pasture form the principal riches of this country. It is divided into Upper and Lower; the chief towns of the former are Sallanches, Samoens, Taninges, and Flumet, and those of the latter are Cluse, Bonne, and Bonne Ville. This province now belongs to France, and constitutes part of the department of the Leman.

FAUCOGNYE, a town of France, in the department of the Upper Saone, and chief place of a canton in the district of Lure; 9 miles N. of Lure. The place contains 983 and the canton 16,205 inhabitants, on a territory of 200 kilo-metres and in 17 communes.

FAUCON, or FALCON, in Gunnery, is a name formerly given to a small piece of cannon, whose diameter was 24 inches; weight, 750 pounds; length, 7 feet; load, 24 pound; shot, 4 inches diameter; and 26 pounds weight. See CO- NON.

FAUCONCOURT, in Geography, a town of France, in the department of the Vosges; 4 miles N.W. of Ramberviller.

FAUCONET, or FALCONET, in Gunnery, a very small piece of ordnance, whose diameter at the bore was 24 inches; weight, 600 pounds; length, 6 feet; load, 12 pound; shot, something more than two inches diameter; and 14 pound weight. See ORDNANCE and Gun.

FAU, in Agriculture, a provincial term employed in some places to signify a truce of short-fallow, or as much as the arms are capable of folding.

FAVELOINE,
FAV

FAVOLONE, in Geography, a river of Naples, which runs into the sea, 4 miles from Squillace.

FAVENTIA, in Ancient Geography, a town in the S.E. part of Gallia Ciladana. See PAENZA.

FAVERGES, in Geography, a town of France, in the department of Mont Blanc, and chief place of a canton in the district of Annecy. The place contains 2,126, and the canton 12,423 inhabitants, on a territory of 240 kilometres, and in 16 communes.

FAVERNEY, a town of France, in the department of the Upper Saone; 7 miles N. of Vezoul. N. lat. 47° 46'. E. long. 6° 11'.

FAVEROLLE, a town of France, in the department of the Marne; 12 miles W. of Rheims.

FAVEROLLES, a town of France, in the department of the Cote d'Or; 12 miles E. of Chatillon-sur-Soine.

FAVERSHAM, a market town in the hundred of the same name, and county of Kent, England, is situated on a navigable arm of the river Swale, and contains principally of four streets, forming an irregular crois, in the centre of which is the Guildhall and market place. Though a borough by prescription as well as charter, it does not appear ever to have been summoned to return members to parliament; it has, however, been the place of meeting of a Witangemot, or Council of the Wise Men, assembled by king Athelstan, near the year 930, "to enact laws, and construct methods for the future observance of them." At that time, and long before, the town formed part of the royal demesnes; and from the high value of the market and appendages, as stated in the Domesday record, it appears to have been then a place of considerable resort and traffic. In 1147, King Stephen founded an abbey here for Cluniac monks, to whom he granted large endowments and privileges, which were confirmed by successive sovereigns: the monks at twelve parliaments, in the reigns of Edward I. and II.; and the abbey possessed the right of sanctuary, which appears to have been attached even to the parish church, from the time of the dissolution till the reformation. The surrender of the abbey estates was strenuously opposed by the abbots and monks; but resistance being vain, the deed was signed July 8, 1553; the gross revenues of the abbey at that time were flated to be £357:2s. 2d. annually; the nett income £60:12s. 6d. The buildings were extensive and numerous, but most of them have been long demolished; the two entrance gateways remained till the middle of the last century, when they were taken down on account of their ruinous state.

Faverham has been an appendage to the port of Dover from a very remote period; its customary proportion of aid was one ship for forty days annually. At the siege of Calais, however, in the time of Edward III., this town furnished two ships and fifty-three mariners. This connection with the Cinque Ports may probably account for the distinguished privileges and charters (scarcely to be equalled by any town in the kingdom) which Faverham has immemorially been favoured with by different sovereigns. The charter under which it is still governed was granted by Henry Vllth, A. D. 1545; the jurisdiction is thereby vested in a mayor, twelve jurats, (the mayor being one,) twenty-four commoners, a warden or recorder, a town clerk, and two chamberlains.

"Faverham," says Leland in his Itinerary, "is excluded yon one paroch, but that ys very large. Thir commeth a creeke to the townes that barth vesells of xx tunnes; and a mile fro thens north-west, is a great key, called Thorn, to discharge barge vesells. The creeke is feede with bakke water, that commeth fro Ospring." In the survey of maritime places in Kent, made in the reign of Elizabeth, this town is stated as having 380 inhabited houses; 18 ships or vesells, from five to forty-five tons burthen; and 50 persons occupied in merchandize and fishing. The quay, called the Thorn, mentioned by Leland, has long been out of use; but its place has been supplied by three new quays or wharfs, formed close to the town, where all the shipping belonging to the part trade in and discharge their cargoes. Since Leland's time great improvements have taken place in the navigation of the creek; and vesells of eighty and an hundred tons burthen can now come up to the town at common tides; whilst, at spring tides, the channel is deep enough for ships drawing eight feet water; the corporation are invested with the management of the navigation, the expense being defrayed by port-dues of very ancient establishment. Upwards of 40,000 quarters of corn are annually shipped here for the London markets; hops, fruit, wool, ouylers, &c. are also sent in considerable quantities from this port, to which above thirty coasting vesells (exclusive of fishing smacks) belong, of from 40 to 150 tons burthen; the imports are principally coals and fir timber, iron, tar, &c. from Sweden and Norway. A branch both of the excise and of the customs is established here; the former under the direction of a collector, surveyor, and other officers; the latter under a supervisror and affiants. The oyster fishery of Faverham is a very extensive concern, and forms the principal source of its trade, affording support to upwards of an hundred families. Here, as at Milton and Rochester, the native brooks fall very short of the confinement; and vast quantities of oysters are annually collected from different parts of the surrounding sea, as distant as the Land's End in Cornwall, and the coasts of Scotland and France, and placed in the beds belonging to this fishery, there to increase and fatten.

The company of the "free-fishermen and free-dredgers of the hundred and manor of Faverham" are under the immediate protection and jurisdiction of the lord of the manor, as tenants thereof; and he appoints a steward to hold two annual courts, called admiralcy, or water, courts, for the necessary regulations of the fishery. No person is admitted as a free dredger unless he has served an apprenticeship of seven years to a freeman, and is married. The right of the fishery was anciently an appurtenance to the manor of Milton, but was separated from it by King John, and granted, with the property of the grounds, to Faverham abbey; in that grant the company of free-dredgers of Faverham is fully mentioned, but it is generally supposed to have expired from time immemorial. Before the war, Faverham oysters, to the amount of between 30 and 40000, were annually exported to Holland. The only manufacture carried on in the vicinity of Faverham is that of gun-powder, which is under the superintendence of a branch of the ordnance established here, the principal officers of which are a foreman, a clerk of the cheques, and a master firework, who all have a reasonable house. The various mills, flour-mills, &c. are chiefly situated on the stream that flows from Ospringe, and forms several small islands in its course to the Faverham creek. This manufacture is supposed to have been established here prior to the reign of Elizabeth; but it was a private concern, and continued till about the year 1586, when the respective works were purchased by government, and then afterward were rebuilt in a more substantial and safe manner. Notwithstanding the care that was exerced, it, however, sufficient to prevent accidents by the occasional ignition of the powder. The most dreadful explosion that has occurred took place
in April 1781, when the corn-mill and distilling-house were destroyed by the blowing up of about 5000 pounds of powder, which so incriminated the air with sulphur, for many miles round, as greatly to affect respiration. The quantity of powder annually manufacured here is computed at between 12 and 13,000 barrels; the persons employed are nearly 400.

The church of Faverham is a spacious and handsome edifice, built of flint, in the form of a cross, and coigned with stone. It consists principally of a nave, with aisles, chancel, and transept, with a light tower at the west end, ornamented with pinnacles, and terminated by an octagonal spire, 73 feet high. On the north side of the church-ward is a free grammar-school, founded in the 18th year of queen Elizabeth, and endowed with certain lands then in the possession of the crown, but which had been given in the 18th of Henry VIII. to the abbey of Faverham, by Dr. Cole, a Kensington, warden of All Souls' college in Oxford, for the "maintenance of a school, wherein the notices of the abbey were to be inscribed in grammar."

The town has been greatly improved within the last 40 years; in 1753 a spacious avenue was formed, by which it was laid open to the high London road. The contiguous roads have since been rendered more commodious. The streets have also been paved and lighted, under an act of parliament obtained in 1780. Faverham is situated about 48 miles distant from London; it has two annual fairs, and two markets, well supplied with all kinds of provisions, on Wednesdays and Saturdays; and was returned under the act of parliament in 1801 as containing 570 houses, inhabited by 3373 persons.

Among the eminent natives of this town, several were renowned: of these Hano de Faverham was a learned Franciscan friar, who became provincial of his order, and died in Italy, at an advanced age, in the year 1244; and Simon de Faverham was chancellor of the university of Oxford about 1344. The celebrated musician, Dr. John Wilson, was also born in this town, in 1595: Hailed's History of Kent.


FAUGEL, in Geography, a town of Egypt, on the right bank of the Nile.

FAUGH, in Botany, a term used provincially to signify a fellow, or land lying in the slate of tillage without being cropped. It likewise implies land which is repeatedly ploughed over without any intervening crops. It is mostly made use of in the more northern parts of the island, and frequently written fawf.

FAUGHAN, or FAHAN, in Geography, a river of the county of Londonderry, Ireland, which rises in the mountains separating that county from Tyrone, and winding to the west, receives a considerable addition from the Glenarland river near Clady. It afterwards takes a north-easterly direction, and being navigable for small craft fearfully one mile, runs into Lough Foyle, not far from the place where the river Foyle also runs into it. Sampson's Londonderry.

FAVIDA, as landfill in the gulf of Georgia, discovered by the Spaniards in the year 1791, near the W. coast of North America, from which it is separated by a channel, called "Canal del Nueftra Signora del Rosario," 30 miles in length from N.W. to S.E. and from 2 to 5 in breadth. The N.W. point is named Point Marshall, and the S.E. point, Point Upwood.

FAVILLA SALIS, in Natural History, a name given by Vitruvius, and some of the more ancient writers, to the nitrum or nitre of the ancients. Our chemical writers, who have been used to delight much in hard names, have applied the same phrase to express our nitre; but this is a very different salt from the other.

FAVILLA, among Antiquaries, a hole, pit, or vault, under ground, wherein is kept something of great value.

The word seems formed from Favilla, a diminutive of fovea, a pit or ditch.

The Favilla, according to A. Gelius and Varro, was much the same with what the ancient Greeks and Romans called Scorpio, thiara, and what in some of the modern churches is called archives and treasury. In the Capitol there were divers favillas. They were subterraneous places, vaulted and walled, having no entrance or light but by a hole at the top, which was usually stopped up with a huge stone.

They were chiefly defined for keeping the old rents of ancient statues and other ancient monuments formerly used in the temple; fo religiously did that people respect and preserve whatever was consecrated. Calivhus would have lowered the floor of the Capitol, but that the favilla prevented him.

Fellus, however, gives us a different account of the favilla. According to that author they were wells or pits of water near the temples, and for the use thereof, the same with what the Greeks called oskias, novel, as being round, &c. Gelius likewise gives them the name of cisterns, as well as Fellus; but it is apparently for no other reason than that they bore a resemblance to them in figure.

In effect, the two notions are pretty easily reconciled; it being certain that the treasures of some of the ancient Greek temples were the cisterns or reservoirs of water where in people used to wash themselves before they entered the temple.

FAULBACH, in Geography, a town of Germany, in the county of Wertheim; 3 miles W. of Wertheim.

FAULQUEMONT, a town of France, in the department of the Moselle, and chief place of a canton in the district of Metz, near the river Nid; 16 miles E. of Metz. N. lat. 49° 3'. E. long. 6° 40'. The place contains 1,055, and the canton 13,555 inhabitants, on a territory of 250 kilometres and in 55 communes.

FAULT, in Mining and Geology, is a term pretty generally used for the filisses which are found dividing the masses or strata of the earth, which form one of the most curious and important facts that the crust or surface of the earth presents. The great prevalence of faults, and the important interruption which they sometimes give to mining, have occasioned them to be noticed by the practical miners of every district; and, as it is too often the case, they have received from them a great number of different names, in different districts, or according to the mode in which they appear to affect the vein or seam which they are working. In the course of our reading or practice we have met with all the following names for faults: vae.

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and
and probably others! Doubtless there are some which we never heard or met with. The above list strongly throws the necessity for a reform in the language of mining. That faults are real breaks or mechanical fractures of the strata, no one who has ever seen and examined one can possibly doubt; and since the worn flate of their surfaces, or of the edges of the strata which they separate, has been attended to, there cannot remain a doubt but most of them have had a sliding motion, or formed the vertical junction between two masses of strata which often slide or ground forcibly against each other, as Mr. Farey has observed, and which gave the first rise to a new theory on this and many other points in geology. (Philosophical Magazine, vol. xxx. p. 258.)

The direction of faults seldom differs greatly from a perpendicular to the planes of the strata, which they intersect, although they are sometimes much inclined to the perpendicular to the horizon. They generally proceed in straight lines, or nearly, until they intersect into other faults, which they never fail to do. The quantity of the fault, or rife, on one side, compared with the other, is seldom the same for any great length of the same fault, but it decreases in the same way, until the measures on the two sides will at a certain place be found to match; and it is believed, that in some places, where the fault continues forward, that the same is reversed, and the side which before had the measures the highest, now has them the lowest, and inereasingly so. On the contrary, if a fault be pursued in the direction in which it increases the derangement of the measures, a point will be found, where it either terminates by intersecting into another, or of a fault, or should it continue its first direction, in which it will begin to decrease, and perhaps continue to do so until the measures cease to have any derangement in their levels, but are merely separated by a fissure; and where, if a fault occurs, the same may be laid to termate, and actually does so, against the solid face of the measures on the opposite side of the cross fault in some instances. It is believed by some, that the principal faults generally take the same direction as the fissures, or natural joints, by which the rock is divided into blocks, in which case they are said by the quarrymen or miners to agree with the face of their work. In mineral districts it is certain that the faults are much influenced in their directions by the mineral veins, which are of older formation, and that the principal ones follow the veins, dividing the matters they contain into two parts, and when the fracture has happened through the rib of ore, the same is in a very curious manner polished, as Mr. Whitehurst observes, under the name of nicker-fissure, which he finds. This preference of the faults for the mineral veins has occasioned much of the chills or facades in the denudated mineral districts of Derbyshire and Staffordshire to happen at the side of skirt of the vein; and in other veins considerable veins of ore have been worked at the foot of such chills, as at Middle-peak, Runtor and Yoke-cliff veins near Wirkworth. It seems surprising, that circumstances so extraordinary and important as attend the faults should have engaged so little of the attention of the writers on mining and geology as we find by their works. Mr. William Martin, though in most respects a very accurate observer, in his recent work, "Outlines of the Knowledge of Extraneous Tuftils," vol. iii. p. 572, considers mineral veins and faults as having the same origin, and indeed almost contains them together.

It is necessary to observe, respecting the term fault, and many others in the above list, that they not only mean the fissure or separation itself, and the derangement of the strata occasioned thereby, but also are applied to the fold and extraneous matters with which the fissure or fault is in general filled; for it often happens that the fissure is of some width, sometimes many yards, and is wedged quite full of matter, generally clay, with some mixtures of other substances, and sometimes angular and rounded stones are among these. A large portion of the faults are water-tight, and hold up the springs of water contained in the strata on one side of them. But it is not true, we believe, that water is ever lodged in the fault itself, as Mr. Kirwan affirms (Geol. Eff. 296.), but it frequently happens, that the cutting of a fault by miners, that is, the driving a passage through it, or the burrowing-in of a thin fault, lets in a great body of water to the mine, which was before pent up in the porous strata and open cracks of the rocks on the other side, which has probably occasioned his mistake. In the neighbourhood of old mines in particular, the excavations precautions are often necessary in cutting or even approaching the thin faults, for fear of drowning the miners by a sudden influx of water.

FAUNALIA, in Antiquity, feasts celebrated by the Romans in honour of the god Faunus.

The deity Faunus, to whom the solemnity was devoted, and from whom it was denominated, was the same among the Romans with the Pan of the Greeks.

The Faunalia were held on the day of the nones of December; i.e. on the fifth day of that month. The principal sacrifice was a foe-buck; or rather, according to Horace, a kid attended with libations of wine, and burning of incense.

It was properly a country festival, being performed in the fields and villages, or in the midst of woods, with peculiar joy and devotion.

Horace gives us a very gay description thereof in the eighteenth ode of his third book:

"--- Tenet pleno cadit hordus auno:
Larga nec definit Veneris fodali
Vina cratera: vetus ara multo.
Fumant odorce."  

Struvius, in his Roman calendar, marks the feast of Faunus on the day of the ides of February, which is the thirteenth day of that month; and the Faunalia he places on the fifth of the ides of December, or the ninth of that month; and in chap. i. he dwells, that there really were two Faunalia, the one in February, mentioned by Ovid, Fast. lib. vi. ver. 246. the other on the ninth of December, mentioned by Horace, in the place just cited.

FAUNS, FAUNI, among the ancients, were a species of demi-gods inhabiting the forests; called also Sylvans, Sylvii, and little differing from the Satyrs. They delighted more particularly in vineyards, and they generally appear as attendants of Bacchus, in the representations of Bacchanal feasts and processions. They were represented as half men, half goats, having the horns, ears, feet, and tail of a goat, a very flat nose, and the red human.

The Roman Fauns, whom we have observed, was the same with the Greek Pan. Now, in the poets we find frequent mention made of Fauns and Panes in the plural number; in all probability, therefore, the Fauns were the same with the Panes.

Though the Fauns were held for demi-gods, yet they were supposed to die after a long life. Arminius says that their father or chief, Faunus himself, only lived 120 years.

FAVONIUM, in Rome, from Vauvix, a town on the Rhone, in allusion to the appearance of its receptacle after the seeds are fallen. (Curtin, v. 2. 431. t. 174.) plaza and order, Synge

Gou. Ch. Comus clayey double; the central of many

Ed. 2
unequal, elliptical, entire, spinous leaves, the outer ones much the largest; *internal* simple, of one leaf, firmly united with the receptacle, bordered with numerous, unequal, spinous teeth. *Cor.* compound, radiant; *florets* of the disk androgynous, tubular, five-cleft, regular; those of the radius unisem, ligulate, three-toothed. *Stam.* Filaments five; anthers united into a tube. *Pyl.* German obovate, crowned; style rather longer than its own corolla; stigmas two, revolute. *Peric.* none, except the permanent calyx. *Seeds* solitary, inerely pyramidal, smooth, lead-coloured; crown membranous, of one leaf, cut half-way down into numerous radiating teeth. *Recept.* broad, naked, deeply cellular, the cells irregular, with thick, even, smooth edges.


1 F. *epinianum.* (Polymania *epinianum*; Linn. Suppl. 384. *Chlorilla* *epinianum*; Thunb. Prod. 163. *Didelta* *epinianum*; Ait. Hort. Kew. v. 3. 216.) See *Didelta,* where this plant is described, but from which genus we are now convinced, by Lartet's remarks, it ought to be removed.

FAVONIUS, among the Romans, the wind which blew directly from the west.

FAVORINO,* in Biography, a celebrated Platonic philosopher, who flourished under the reigns of Trojan and Augustus. He was born at Arles in Gaul, and studied under Dio Chrysostom. He was himself profoundly skilled in philosophy, and wrote numerous books on the subject. He taught with much reputation at Rome, and at Athens. He was highly respected by Adrian, and frequently disputed with that prince, though not always with the decision of a philosopher. Being once reproached for having tamely given up a point in debate, he replied, "Are you astonished that I should submit to the superior learning of one who has thirty legions of troops at his command?"

He is reported to have been an eunuch, and is said to have felt surprize at three things, viz.: that being a Gaul, he could speak Greek so well;—that being an eunuch, he should have been accused of adultery;—that being a subject of envy and jealousy, he should be permitted to have lived so long.

FAVORINUS, Varinius, who flourished in the 16th century, was born near Camerino, a ducal town of Umbria. He studied under Angelo Politian, and John Laiicaris at Florence, and was patronized by Lorenzo the Magnificent. Having determined on an ecclesiastical life, he undertook the care of a congregation, and was appointed preceptor to John de Medici, afterwards pope Leo X. Favorinus was appointed keeper of the Medicean library in the year 1512, and two years afterwards his former pupil nominated him to the bishopric of Nocera; the duties of this high office he performed, so as to obtain high and very general respect, till his death, which happened in 1537. His principal work, as a literary man, was a Greek lexicon, entitled "Magnus Dictionarium, seu Thesaurus Linguis Greecis," &c. fol. This work is wholly in Greek, and furnishes scholars with the various explications of words, which are to be found in other lexicons. It has gone through many editions, but the most beautiful and correct is said to be that of Venice in 1712. He was author of several other publications. Moreri.

FAVORITE, in Ornithology. See *Fulica flavipennis.*

FAVORITO, in the Italian *Mijes,* is an epithet given to such parts of any composition as are performed to the greatest advantage. Thus, choro favorite is a chorus in which are employed the best voices and instruments to sing the recitatives, play the ritornellos, &c. This is otherwise called the "little chorus, or choro recitante."

FAVOUR, in Commerce. See *Daye of Grace.*

FAVOUR, in Mythology, a defied person among the ancients, of whom we merely learn, that Apelles made a fine picture of this deity.

FAVOURABLE LAKE, in Geography, a lake of N. America, in N. lat. 52° 50'. W. long. 92° 30', which is the source of two large rivers, at the mouth of one of which, emptying into Winnipage lake, forms the Canadian house. The other is the S. W. branch of Severn river.

FAUP, one of the Caroline or New Phillipine islands, in the Pacific ocean.

FAUQUEMÉRQUES, a town of France, in the department of the Eruit of Calais, and chief place of a canton, in the district of St. Omer, 11 miles S. W. of St. Omer. The place contains 1,250, and the canton 14,852 inhabitants, on a territory of 1824 square kilometres, and in 24 communes.

FAUQUEMONT, or Valkenberg, or Valkenberg, a town of France, in the department of the Lower Meuse, situated on the Geule; 12 miles W. of Aix-la-Chapelle.

FAUR, Guy Du, Lord Du Pierce, in Biography, an eminent lawyer and man of letters, was born of a distinguished family at Toulouse in 1528. He was educated at Paris, and then went to Italy, to perfect himself in jurisprudence. On his return he figured away with high reputation in the parliament of his native city, and was chosen a deputy to the states of Orleans in 1559, at which he had the honor to present a memorial of grievances to the king. He was afterwards selected as ambassador from Charles IX. to the council of Trent, where he ably defended the rights of the Gallican church. In 1565, he was nominated advocate general in the parliament of Paris, and in this capacity he composed an apology in Latin, for the infamous massacre of St. Bartholomew. He next accompanied the duke of Anjou, afterwards Henry III. when he went to take possession of the crown of Poland. He was selected to other high diplomatic stations, but was at length charged with indulging an amorous passion for the queen of Navarre. Some respectable writers treat this charge as a mere calumny. He died in 1584, leaving behind him, as memorials of his literary character, "Pleadings and Harangues," "A discourse on the Soul and the Sciences," but his name is chiefly famous for a series of moral maxims in French verse, entitled "Quatrains;" they are written with elegance and spirit, were extremely popular, and have been translated into the Latin, Greek, and modern languages. Moreiri.

FAURANO, in Geography, a town of Naples, in La- vora; 17 miles E. of Naples.

FAVRE, Antony, in Biography, was born at Bourg-en-Bresse in 1557, studied at Paris and Turin, and was raised to several important posts under the duke of Savoy, and finally was made governor of that country, and all the provinces beyond the mountains. He was also president of the council of the Genevois for the duke of Nemours. His character for professional knowledge, and strict undeviating integrity, was extremely high, and he might have attained to considerable rank in France under Lewis XIV. could he have induced him to quit Savoy. He died in 1624. His works on jurisprudence were published in ten tomes, folio, of which the principal is entitled "Codex Fabiani." This has been referred to in all the parliaments of France. Moreiri.

FAVRE, Claude, lord of Vaugelas, son of the preceding, was born in 1585, and early brought up in attendance upon
the court. He was made gentleman in ordinary, and afterwards chamberlain to Gallyon, duke of Orleans, whom he followed in all his fortunes, though to the ruin of himself and his prospects. He was a distinguished member of the French academy, and devoted his whole leisure time to the study of his native language, by which he has perpetuated his name. He published "Remarks on the French Language," and a translation of "Quintus Curtius." On the latter he is said to have spent thirty years, and it accordingly obtained for him a high reputation. Lewis XI. had settled upon his father and family a pension, the payment of which, however, had ceased, but was renewed to Claude, with a view of inducing him to engage in the compilation of the dictionary of the academy. On this occasion Richelieu said to him, "I hope you will not forget the word penfion in your dictionary." "No," my lord, replied Favre, "and still let the word gratitude," a delicate, but forcible reproof for the cardinal. Favre died insolvent in 1650.

Morevi.

FAUSSE, Fr. in Faufle, false, out of tune, by being too high or too low. There are false voices, as there are false things. It is supposed that this is occasioned by a bad ear, but the mischief is done before the sound arrives at the ear; and we have known persons sing out of tune, who drop perfectly well in time on the violin, and who judge very accurately of the intonation of others. It is often from defect of the organ, which is disobedient to the will of the owner, that false intonations occur; intonations perfidi.

FAUSSE-BRAY, in Fortification, is a strong parapet, or a low rampart, formed by a continuation of the revetment of the earp, carried up to such a height, generally about seven feet, as should enable the defenders to fire directly into the covert-way, and to obstruct the assailants not only from making any lodgment there, but from attempting the passage of the ditch. There are certainly points of importance, and it should seem that the fausse-bray polished in itself the means of anfwering every part of its intention; and such, indeed, would probably have continued to be the case, were it not that the invention of ricochet-firings, by which the ball is made to lob along the interior of a defence, (see Enfilade and Épaulement) totally desquishes the fausse-bray from being considered a place of security. Add to this most formidable objection, that, where the rampart is furnished with a revetment of masonry, the splinters occasioned by such shots as may strike thereon, prove more destructive than the open fire of many situations apparently more exposed.

In consequence of such important defects, modern engineers have totally discarded the fausse-bray as a defence, though it may be advantageously constructed in certain insurances as the only effectual means of preventing the rubbish occasioned by the breaching-batteries of the assailants from falling into the ditch, so as to afford the means of ascent. In lieu of a fausse-bray, it is now the practice to plant a very strong fence, a few feet distant from the foot of the rampart, for the above purpose, as well as to conceal such perches as may have occasion to pass along the hem.

The defence of the covert-way, and of the passage of the ditch, is found to be more effectually supported by the construction of a low work, called a tenaille. (see Construction Military,) placed before the patterns in the curtains; and from which the fire is more powerful than that from the flanks; it being more horizontal, and much nearer.

FAUSSE Cheminé, in Natural History, a term used by Mr. Reaumur, and other of the French writers, to express a large chaf of worms produced from the eggs of several species of four-winged flies. These worms have greatly the apparence of caterpillars in their general form, so that they have deceived many writers on insects into an opinion that they were really so; but M. Reaumur has shown that they are very different. Hill Inf. vol. ix. p. 133.

FAUSSE Quatte, Fr. in Mysfe, another name for the Triton, or sharp 4th. See Tritonus.

FAUSSET, Fr. is that kind of voice which rings an octave above its natural compass, to imitate a boy or a female. A voice on this occasion resembles a flute or organ pipe over-blown, or blown with a sharper current, when it breaks into the octave. See Octave and Falset.

FAUST, John, in Biography, a goldsmith at Mentz, celebrated on account of the share which he had in the invention of the art of printing. It has never been ascertained to whom we are chiefly indebted for this admirable art. Claims have been made for persons named Guttemberg and Scheffer, and it has been ascertained that Faulf only furnished money to Guttemberg to enable him to bring the invention to a flute of maturity, he having previously, at Stralsburg, made the attempt with carved blocks. Scheffer, who was hon-in-law to Faulf, invented punches and matrices. To the first work that was printed the names Faulf and Scheffer are attached; this was entitled "Durandi Rationis divinorum officiorum," 1539. Among other works to which these names are attached are the Bible, and two editions of the Psalter. These were executed with characters engraved on wood, and are now exceedingly rare, and considered as master-pieces of typography: the characters are cut to imitate the finell writing, and the initial letters are printed in three colours, blue, red, and purple. It has been said that Faulf went to Paris to sell some copies of his bible, and having sold them at a low price, in comparison of what was given at that time for manuscript bibles, and at different rates, his customers having heard of his mode of printing them, professed him on account of the overcharge. From this period Faulf never appeared at Paris, and it is thought he died of the plague in the year 1466. Nova Diss. Hist. See Printing.

FAUSTED, in Minings, is a refuse sort of ore and spar, intended to be dressed over again.

FAUSTINA BORDON, in Biography, a celebrated female finger at the early part of the last century; she was a Venetian, and a female of Michael Angelo Gafparini of Lucca. She in a manner invented a new kind of finging, by running divisions with a neatness and velocity which astonished all who heard her. She had the art of sustaining a note longer, in the opinion of the people, than any other finger, by taking her breath imperceptibly. Her beats and trills were strong and rapid; her intonation perfect; and her professional perfections were enhanced by a beautiful face; a symmetric figure, though of small stature, and a countenance and gesture on the stage, which indicated an entire intelligence and perfection of the several parts she had to represent. She first appeared, as a theatrical finger, at Venice, in 1716, when she performed in the opera of "Ariodante," composed by Carl. Fräul. Pallarolo. In 1719, she appeared on the same stage with Cuzzoni and Bernacchi, in an opera composed by her master Gafparini. Here she is called Vincenza d'Arma. The Electir Palatine. In 1721, she sang in Leo's opera of "Bajazet," at Naples; and in 1725, we find her at Vienna, where, according to Apollon Zeno, she received great honours, as well as preferments. At the palace of prince Liechtenstein, singing to a great assembly, she was presented with a purse containing a hundred pieces of gold (ungheri rupii); and near as much more at the French ambassador's. "But," says this poet, "whatever good fortune or encouragement the meets with, the merits it all by her courteous and polite man-
**Fau**

er's as well as talents, with which she has enchanted and gained the esteem and affection of the whole court. The fame author speaks of *Dea bravura di Fauhina* and the *Dea musica di Porfla,* in an opera by the Abate Paladini, performed at Venice, 1725; and of the regret expressed by the whole court at her quitting that city to go to London. She remained here but two seasons, and then returned to Venice, where, in 1732, she was married to the celebrated Saxon composer Haffe, and soon after went to Dresden, in the service of which court she remained till the year 1756. At the bombardment of that city by the late king of Prussia, Haffe, her husband, had all his manuscripts burned, which were to have been printed at the expense of his mater and patron, the elector.

A late writer upon music, of considerable merit with respect to the present times, though frequently erroneous as to the past, speaking of the Fauhina, says that her agility of voice has seldom been equaled; a matchless facility and rapidity in her execution; dexterity in taking her breath, exquisite shake, new and brilliant passages of embellishment, and a thousand other qualities contributed to inscribe her name among the first in Europe.

The Cuzzoni, an exquisite singer in a different style from that of the Fauhina, being here at the same time, occasioned such fresh springs among the nobility and gentry, subscribers to the Royal Academy, as form an era in the annals of musical contests; for no disputable were the talents of these two fingers, that in Handel's opera of *Aleidadro,* the flames of discord were kindled to such a height among the frequenters of the opera, and patrons of the arts, as to excite a greater degree of enmity than even the theological and political parties of High church and Low, or of Whig and Tory, which then raged in this city.

It was related by the Hon. Mr. Walpole (late Earl of Orford) that his mother, the lady of air Robert Walpole, had these two fires at her house to sing in a concert, at which were all the first people of the kingdom. She was under the greatest difficulty how to settle the precedence, or prevail on either to relinquish the place, which could only be accomplished by renouncing the pleasure of hearing either of them, herself; the knot could not be untied, but it was cut by the following expedient. Lady W., finding it impossible to prevail on one to sing while the other was present, took Fauhina to a remote part of the house, under the pretence of showing her some curious china, during which time the company obtained a song from Cuzzoni, who supposed that her rival had quitted the field. A similar expedient was practised in order to get Cuzzoni out of the room, while Fauhina performed.

The Fauhina had a mezzo-soprano voice that was less clear than penetrating. Her compas was only from B flat to G in alt.; but after this time she extended its limits downward. She poisoned what the Italians call *un cantar granato:* her execution was articulate and brilliant. She had a fluent tongue for pronouncing words rapidly and distinctly, and a flexible throat for divisions, with so beautiful and quick a shake that she could put it in motion upon short notice, just when she would. The passages might be smooth or rough, or confining of iterations of the same tone, their execution was equally easy to her as to any instrument whatever. She was down left the first who introduced, with success, a new repetition of the same tone. She sung adagios with great passion and expression, but was not equally successful, in such deep sorrow were to be impressed on the hearer, as might require dragging, sliding, or notes of syncopation, and tempo rubato.

She had a very happy memory in arbitrary changes and embellishments, and a clear and quick judgment in giving to words their full power and expression. In her action she was very happy; and as she perfectly possessed that flexibility of muscles and features, which constitutes face-playing, she succeeded equally well in furious, amorous, and tender parts: in short, she was born for singing and acting. The violence of party for these two fingers, Cuzzoni and Fauhina, was very great.

For, according to Tofi, their contemporary, and a most excellent judge of their several merits, their talents, and styles of singing, were so different, that the profile of one was no reproach to the other. "Indeed, their merit," says he, "is superior to all praise; for with equal forces, in a different style, they help to keep up the tottering profession from immediately falling into ruin. The one is inimitable for a privileged gift of singing, and enchanting the world with a prodigious opinion in executing difficulties with a brillianciness, I know not whether from nature or art, which pleases to excess. The delightful soothing cantabile of the other, joined with the sweetness of a fine voice, a perfect intonation, quickness of time, and the rarest productions of genius in her embellishments, are qualifications as peculiar and uncommon, as they are difficult to be imitated. The pathetic of the one, and the rapidity of the other, are distinctly characteristical. What a beautiful mixture it would be, if the excellences of these two angelic beings could be united in a single individual!" (Offelia opera il catao fig.) Are not these reflections applicable to the two great singers (Banti and Billington) of the present time, who have each their exclusive admirers? It is a very ancient remark among musical critics, that pathetic fingers have no brilliancy of execution, nor those possessed of great agility of throat, much pathos. Would it not have afforded more delight to persons of taste and discernment, to hear two great performers at the head of different styles, than the perpetual struggle of two contend ing fires in the same flame? Then, after taking the partisans have an opinion to defend, which generates disputes that seldom end short of contempt and hatred of each other.

In June, 1782, we found the old Fauhina and her husband, the admirable Haffe, commonly called Saffoni by the Italians, and their two daughters at Vienna. She was then about 72, but lively, and curious after what was transacting in the world. The daughters were very fine fingers in different styles. On the Fauhina being asked to sing, she cried out: "Ah! non posso: ho perduto il mio facolo! Ah! I am no longer able, I have lost all my faculties!" This worthy family remained at Vienna till the year 1775, then retiring to Venice, the place of the Fauhina's nativity, where the daughters were well married; she ended her days in 1793, at the great age of 81; and Haffe died soon after, at nearly the same age.

**FAUSTINO, St. in Geography,** a town of South America, in New Granada; 40 miles N. of Pamplona. N. lat. 6° 55'. W. long. 71° 54'.

**FAUTAC,** a town on the coast of Madagascar. S. lat. 24°. E. long. 57°. 45'.

**FAUVILLE-EN-CAUX,** a town of France, in the department of the Lower Seine, and chief place of a canton, in the district of Yvetot; 10 miles N. of Caudebec. The place contains 1,346, and the canton 12,956 inhabitants, on a territorial extent of 11,215 square miles, in 20 communes.

**FAUX, Fr. in Mytie, salla.** See FAUSS.

**FAUX-BOURDON, Fr.** See FAULSO-BORDONE, and FAUBURDIN.

**FAUX-BOURDON,** bushy humble bee, in Natural History, a name given by Reaumur and other French naturalists to the
the bees usually called by us drones, and by the common people of that nation bumble-bee under that name. See Drone.

Faux Pascreon, a name given by Réaumur and others to a genus of insects much resembling the puceron in many things, but differing in some material circumstances. The two principal kinds of these are found on the back of the leaves of the fig-trees, and in little hollow balls at the summits of the branches of oak, formed of the upper leaves vitiated by the bitings of these creatures.

Faux Villiers, in Geography, a town of France, in the department of the Forêts, and chief place of a canton in the district of Neufchâteau. The place contains 938 and the canton 5,841 inhabitants, on a territory of 255 kilometres and in 14 communes.

Fawkes, Francis, in Biography, was born in Yorkshire about the year 1721. He received his grammar learning at Leeds, whence he was transferred to Jesus college, Cambridge. He was educated for the church, and presented to the vicarage of Orpington, with St. Mary Cray, in Kent, by archbishop Herries, whose death, in 1757, was noticed in an elegy by Mr. Fawkes. In 1761, he published a volume of poems by subscription, and took part in some periodical publications. In 1767, he published an elegy, addressed to the honourable Charles Yorke, on partridge shooting. He is more celebrated for translations than for original compositions. His versions of Anacreon, Sappho, Bion, Moerhus, and Musæus, were popular, and are still in good repute. In 1774, he exchanged his vicarage for the rectory of Hayes, where he died in 1777. After his decease a translation from his pen of the "Argonautics," was published by subscription. "He polished," says his biographer, "an easy flow of vivification, and though his diction is not highly poetical, yet it has the merit of extraordinary clearness, which leaves no hesitation about the meaning of the original." Gen. Biog.

Fawn, among Hunters, is a buck or doe of the first year, or the young one of the buck's breed in its first year.

Fawn, in Geography, a township of America, in York county, Pennsylvania, on the W. bank of Susquehanna river, on the Maryland line; containing 1,214 inhabitants.

Fay, a town of France, in the department of the Indre and Loire; 15 miles S. of Châtillon.

Fay-Billot, L., a town of France, in the department of the Upper Marne, and chief place of a canton, in the district of Langres; 12 miles S. E. of Langres. The place contains 1,699, and the canton 11,453 inhabitants, on a territory of 2774 kilometres, and in 25 communes.

Fay-le-Froid, a town of France, in the department of the Upper Loire, and chief place of a canton, in the district of Le Puy; 15 miles E. E. of Le Puy. The place contains 525, and the canton 5,590 inhabitants, on a territory of 775 kilometres, and in 6 communes.

Fay, To, in Ship Building, is to fit any two pieces of wood so as to join close together; the plank is laid to lay to the timbers when it bears or lies close to all the timbers.

Fayal, in Geography, the most western of the Azore islands. This island derives its name from the great number of beech-trees (Puya, in Portuguese,) which grow here; beside which it abounds with other wood. It is about 27 miles long, and 9 wide; the climate is good, the air is mild, the winter-cold is never felt, and the heat of summer is counteracted by refreshing winds. The bulkheads and hogs of this island are very good, but the sheep are remarkably poor; poultry, vegetables, and fruit may be had at a reasonable price; but the chief produce of the island is wheat and Indian corn, with which they supply Pico, and some of the other islands. Birds are numerous, and the coast affords abundance of fish. Fayal, although the most noted for wine, does not raise sufficient for its own consumption: this article is raised on Pico, and thence brought to Ilhéu, for foreign shipping. The chief town is called Villa de Horta, or Porto. Fayal was first peopled by Flemings, who, gratifying the expense of a Portuguese garrison, undertook to defend the island. But they had reason to repent of their presumption; for the English, at different times, made devastation upon the island, and took it; they destroyed the fortifications, after having seized and burnt a squadron of rich homeward bound ships that lay in the harbour. Since this time a Portuguese garrison has constantly been maintained in the island. N. lat. 38° 22'. W. long. 28° 40' 54".

Fayal, Bay or Road of, is situated at the E. end of the island, before Villa de Horta, and facing the W. end of Pico. It is 2 miles broad, and 3-4ths of a mile deep, being of a semi-circular form. The depth of water is from 20 to 10 and even 6 fathoms, and the bottom sandy, except near the shore, where it is rocky, and also beyond the line which joins the two parts of the bay. It is not a bad road; but the winds must to be apprehended are those which blow from between the S. S. W. and S. E. Round the S. W. point there is a cove called Porto Piere, in which a ship or two may lie in tolerable safety.

Fayd, a town of Syria, on the frontier of Arabist Deferta; 300 miles L. of Damascu.

Faydit, Asselm, in Biography, a native of France, who flourished towards the close of the 12th century. He is celebrated as a Provençal poet, and for his excellent singing, by which he made himself agreeable to persons of rank. He not only composed, but represented comedies, which obtained so large a share of popular favour, as to put the author in possession of considerable wealth, which he squandered away in licentious pleasures, and vain expense. In poverty, he was fortunate enough to attract the notice and favour of Richard Cœur-de-Lion, king of England, who had a passion for poetry, and by him was once more raised to a state of affluence. After the death of Richard, Faydit returned to Aix, where he married a woman as imprudent as himself, but who died shortly after marriage. He next went to the court of the marquis of Montferrat, and afterwards to that of the lord of Sault, where he died about 1222. He wrote a poem on the death of his patron, King Richard; another, entitled "The Palace of Love," and several comedies, of which one, entitled "L'Iliorogia dela Preflres," "The Heroes of Priam," was written to gratify and flatter the wishes of persons of rank, who at that period were favourers of the opinions of the Albigenians, and who he probably expected would become his friends and patrons. Moncri.
the Trinity," for which he was accused of tritheism, convicted and imprisoned at Paris. His suffering had no tendency to repress his zeal, though it probably led him to caution in his future publications. But the freedom of his language, and the want of attention and respect which he shewed to certain illiberal individuals, excited their anger so much, as to procure an order from the foreigner that he should retire to his native place, where he died in 1709. His other works are, "A Collection of Memoirs," intended to facilitate "Tillmont's Ecclesiastical History," which were soon superseded; "Remarks on Virgil, on Homer, and on the Poetic Style of the Scripture," in 2 vols. A critique on Tychaeus, entitled "Telemaco-manic." And other pieces in Latin verse, and French prose. Moreri.

FAYE, in Geography, a town of France, in the department of the Maine and Loire; 10 miles S. of Angers.

FAYE-le-Vineux, in the department of the Indre and Loire; 3 miles S.E. of Richelieu.

FAYENCE, a town of France, in the department of the Var, and chief place of a canton in the district of Draguignan, celebrated for its manufacture of earthenware; 10 miles N.E. of Draguignan. The place contains 2,712 and the canton 9,488 inhabitants, on a territory of 1921 square kilometres, in 6 communes.

FAYETTE, Mary-Magdalen Proche de la Verge, Countess of, in Biography, a lady in high favour at the court of Louis XIV. She was intimately connected with the wits of that period, who were accustomed to assemble at her house, and to many of whom she was a liberal benefactress. Segrais was her particular friend, and in his name the celebrated romances entitled "Zaide," and "The Princefs of Cleves," were given to the public, but he has himself testified that his part in them was only contributing to the plot and disposition, and that the filling-up and ornaments were entirely by Madame de la Fayette. These were extremely popular, and they are spoken of by Voltaire as the first in which the manners of persons of condition were painted, and natural adventures were described with ease and grace. She wrote likewise "Memoirs of the Court of France in the years 1688 and 1689," "The Princefs of Montcpenfier," "The History of Henrietta of England," and "Divina Portrait of Persons about the Court." These were all very much admired for the grace of style, and the delicacy and liveliness of description. She died in 1693. During her life the was ever most flattered with the praise of having a judgment superior to her wit, and loving the truth above all things. Moreri.

FAYETTE, in Geography, an American settlement in Tioga county, New York, between the Unadilla and the main branch of the Chenango. It is laid out in 100 lots of square mile each, as nearly as the ground will permit.

FAYETTE, a county of Pennsylvania, bounded N. by Weldmoreland, S. by part of Maryland and Virginia, and W. by Monongahela river; 39 miles long and 29 broad; containing 473,200 acres; divided into 17 townships, of which Union is the chief. The number of inhabitants is 20,159.

FAYETTE, a district of North Carolina, comprehending six counties, viz. Moore, Cumberland, Sampson, Richmond, Robeson, and Anson. It is bounded N. by Hillsborough, S.E. by Wilmington and Newbern, W. by Salisbury, and S. by the State of South Carolina. It is 120 miles in length, and 50 in breadth, and contains 41,338 inhabitants, of whom 32,06 are slaves. The surface is varied with hills and dales, and is in general well watered.

FAYETTE, a county of Kentucky, 24 miles long, 20

broad, bounded N. by Scott county, N.E. by Bourbon, E. by Clark, S. by Madison and Jefferson, and W. by Woodford. The soil is excellent, though it lies on an eminence. The number of inhabitants is 12,233, of whom 17,869 are slaves. The chief town is Lexington.

FAYETTEVILLE, so called in honour of the marquis La Fayette, a flourishing port town of North Carolina, pleasantly situated in Cumberland county, on the west side of the N.W. branch of Cape Fear river, nearly at the head of the navigation; 100 miles above Wilmington, and 61 southerly of Raleigh. The town is situated about a mile from the river, near the junction of Blount's and Crook's creek; both sides of the creek are about 400 houses, and handsome edifices for public use. The streets are regularly laid out, and the principal ones are 100 feet wide. Here are three mills, two considerabJc dilapidations and breweries, and several extensive ten-yards. This town carries on a considerable trade to Wilmington in tobacco, wheat, flour, beef, pork, flax-feed, hemp, cotton, butter, lumber, flaxes, naval stores, &c. The town stands in a settlement of Scots Highlanders, and has a post office, and 635 inhabitants. N. lat. 35° 11'. W. long. 79° 27'.

FAVRO, a town of Spain, in the province of Aragon, on the confluen of the Matarrana and the Ebro; 15 miles S. of Fraga.

FAVOUR, FAIDUM, or FEIDUM, a province of Egypt, on the west side of the Nile, extending from the river to the lake Burkitt Caroom or Burkitt-el-Kurn, the ancient lake Moeris. This was formerly the province of Arifnes, (which see,) intersected by canals, which formed a communication between the river and the lake, and disfigured by its beauty and fertility, as well as the variety and value of its productions. Since that period this province has, by the oppression of the Turks, undergone a very great change; instead of flourishing cities it now presents to view cottages and hamlets built of mud, canals nearly choked up, and the sea of Moeris reduced to two-thirds of its former extent; and yet the observer will discover the fame productions which Strabo has described, and the fame abundance wherever the waters can penetrate. The Copts still cultivate the olive and the vine planted by their fathers. They gather an excellent grape, of which they make a white wine of very agreeable flavour. The whole country is at present covered with corn, with barley, with dourra or Indian millet, which follow one another in regular succession during seven or eight months. The superb flax, the fagarcane, and all sorts of vegetables, sprin up almost without culture. The cucumber, and various sorts of excellent melons, line the banks of the rivulets. Groves of fruit trees, amongst which are the date-tree, the fig-tree, the banana, the caffa, &c. are here and there dispersed over the plain; near the villages are groves of rose-trees, from the odoriferous flowers of which they distill the rose-water, which forms a valuable branch of commerce. The canals and the lakes abound with fish, which supplies the neighbouring provinces at a cheap rate. When winter is covering the northern countries with snow and hoar-frost, imnumerable flocks of birds come to winter in lake Moeris, and the canals of Faidum. The inhabitants take a vast number of geese, with golden plumage and of an excellent flavour; wild ducks that are fat and delicate, teal, swans, of whom skins they make furs, and pelicans. Savary's Letters on Egypt, vol. i.
F A Z

FAZIUM, or Faisum, a town of Egypt, and capital of the province above described, which formerly possessed public baths, markets, and a college divided by the canal of Joseph into two parts, and surrounded by gardens. At present it is only half a league in circumference, and is situated on the eastern bank of the canal. The remainder is deltroyed; the colleges no longer subsist; the houses built with brick, dried in the sun, present the dreary aspect of a heap of cottages. The inhabitants are poor, and, under oppression, destitute of energy; and all the arts are reduced to some manufactures of mats, coarse carpets, and the distillation of rose-water. This town is governed by a chief, in the name of one of the sons of Grand Cairo. Several Arabian sheiks, who possess lands in the neighbourhood, compose his council, and they repair to the divan two or three times a week, when the governor invites them. Their chief is held in high estimation; but harmony among the members of the administration is not of long continuance. The frequent successive wars at Grand Cairo disturb the tranquillity of the provinces, and the victorious party deprives the possessors of their governments and their lands; 49 miles N.W. of Cairo. N. lat. 29° 27'. E. long. 35° 39'.

SAVARY.

FAYS, a town of France, in the department of Upper Marne; five miles N.W. of Joinville.

FAZILPOUR, a town of Hindoojan, in Guzerat; 12 miles N. of Brodara.

FAZULA, a town of Hindoojan, in Oude; three miles N. of Lucknow.

FAZULAPOUR, a town of Hindoojan, in Bahar; 33 miles N.W. of Bahar.

FAZZELLO, Thomas, in Biography, was born at Saccs, a town of Palermo, in the year 1198. He was entered in the order of Dominican monks, and was their provincial, and might have been elected general of the order, had he his own modesty thwarted the measures taken for the purpose. He was ten times chosen prior of the monastery at Palermo, and died in possession of that office in 1750. He wrote many works, but the most considerable was a "History of Sicily," written in Latin in 20 books, which first appeared in Palermo in 1556, and which has passed through several editions, and was translated into the Italian language. Morei.

FAZZIO, Bartholomew, was born at Spezio, on the coast of Genoa, in the beginning of the 15th century. Though of very humble descent, he became learned in the ancient languages, and translated "Arius's History of Alexander." He likewise wrote a history of that prince in ten books; and a history of the war between the Genoese and the Venetians, which commenced in 1557. He is chiefly regarded for his work "De Viris Illustribus," which contains brief eulogies of the most famous men who were his contemporaries, with anecdotes of their lives, and an account of their principal works. This was not published till a long time after the death of the author, when Mehins annexed some MS. letters of Fazio relating to the history of the times. We have likewise two moral treatises by Fazio, the one entitled "De Humane vitae Felicitate;" and the other, "De Excellentia et perditione Homini;" and a Latin poem. The early part of life he passed at Genoa, whence he was invited to the court of Alphonso, king of Naples, a great patron of learned men, where he remained till his death in 1457. His style is said to be generally pure and elegant, especially in comparison with that of other writers in the same period. A great hatred prevailed between Fazio and Lorenzo Valla, on account of their rivalship for the favour of Alphonso, and each wrote four books of invectives against the other. Gen. Biog.

FAZZOLO, in Geography, a town of Naples, in the Capitanata; 13 miles S.W. of Manfredonia.

FE', SANTA, a town of Spain, in the province of Granada, near the Xenil, built by Ferdinand and Isabella in the year 1491, during the siege of Granada: it is situated in a fertile tract, and though a small town, contains about 2000 inhabitants; five miles N.W. of Granada.—Alla, a town of Spain, in Aragon; five miles S. of Saragossa.

Fe', Santa, a province of South America, in the vice-royalty of New Granada; and the name is sometimes given to the vice-royalty itself from that of its capital.

Fe's de Bogota, Santa, the capital of the vice-royalty of New Granada, situated near the river Funza or Palo, which at the distance of 33 miles falls into the Magdalena. This city was founded in 1538 by Quevedo the Conqueror. Although it lies at a considerable distance to the east of the grand chain of the Andes, which forms N. of the province of Carthagena, between the rivers Magdalena and Cauca, and though it is only four degrees from the equator, the climate is unexpectedly rather cold. It stands in a beautiful and spacious plain, called Alcarazas, and the soil is sufficiently fertile. The city is large and handsome, and its streets are wide and well laid out. There are four squares, and five bridges over two little rivulets, called San Francisco, and San Agustin, which spring from the eastern mountains, and run westward both of the city and its plain, which is about 20 leagues in length and breadth, till they join the Funza, called also the river of Bogota. The whole year, such is the temperature of the climate, may here be called a perpetual spring, and the fertility of the soil produces two harvests. The cathedral is magnificent, and has 16 prebends. Here are also three parochial churches, and eight convenes, with four nunneries, and the great hospital of San Pedro. Besides two religious colleges for education, there is the university of St. Thomas, with a large public library, established in 1772. This beautiful city presents several other churches and chapels. The population is thought to exceed 30,000 souls; and the inhabitants are generally of a good character; and though phlegmatic in their appearance, their nature and aspect are agreeable, and their wit acts. This city is administered by two sheriffs, according to the code of the Indies, or as it is applied to the Royal Audience. The municipality is composed besides of six regidores and other officers. The inhabitants are, in general, not rich, and many of them are occupied in trade, the means of which, however, are rare and uncertain; the secular jurisdiction of this capital comprehends seven little districts in its neighbourhood, with 52 villages, and 5017 Indians, not including the people of colour, supposed to be fourfold that number. N. lat. 4° 56'. W. long. 75° 30'. For other particulars, see Bogota.

Fe', Santa, a town, or rather a village of America, though it is the capital of New Mexico, situated 1200 miles N. of the capital city of Mexico. It is the see of a bishop and residence of a governor. It was founded, in 1662, on the skirts of a high chain of mountains, whence springs a clear river abounding in excellent trout. The river rises from a lake on the summit of the mountain, and falls through the middle of the town. The climate resembles that of Spain, having reasonable rain and snow, the spring being mild, and the summer heats maturing cotton in abundance; the population consists of 300 Spanish families, the Indians in that district not willing to live in the same town with their masters. The surrounding territory is clear of woods, fertile and pleasant, producing wheat, maize, garden plants, etc.
FEA

Fruits, and particularly grapes, of which good wines are made. The pastures are well watered, and replenished with horses, cattle, and sheep. The Rio Bravo rises 50 leagues N.W. of the capital, diffuses fertility, and has its margins adorned with beautiful woods, and its stream abounding with excellent fish. The neighbouring mountains are clothed with tall barren pines, and with those of a smaller fort which bear large cones; the other trees are of different kinds, fynches and others which form excellent timber. The animals are deer, bears, wolves, foxes, wild sheep, and flags of the size of a mule, the horns of which are not less than two yards in length, probably the moose deer. There are mines of tin, which do not defy the excellence of working. N. lat. 35° 50', W. long. 108° 48'.

Fe, Santa, a town of South America, in the vicereignty of La Plata, or Buenos Ayres, at the confluence of the river Salado with the Plata, built by Ferdinand V. The town is of a square form, and surrounded with walls, flanked with towers, and a deep ditch. The two streets intersect each other in the form of a cross. It contains one parish and one convent. The environs abounded in flinck, corn, wine, and fruit; and game is plentiful. S. lat. 31° 50'. W. long. 60°.

Fe' d'Antioquia, Santa, the capital of a province so called, situated on the river Cauca, in the vicereignty of New Granada; highly celebrated for its rich mines of gold. N. lat. 6° 48'. W. long. 74° 36'.

Fe' de Chiribiqu, Santa, a town of South America, in New Andulucia, on the coast; 24 miles W. of Guanuna. N. lat. 10° 5'. W. long. 65'.

Fe', or Fay, Santa, a place in the middle of Veragua, a province in the Audience of Guatamala, in North America, where the king of Spain keeps officers for cutting and refining gold. It stands at the source of a river which runs into the North sea.

Fe, Santa, a city of Paraguay, in South America, 150 leagues S. by W. of the city of Asuncion, leased on the river Paraguay. The inhabitants are chiefly employed in husbandry, grazing, and weaving cloth. They fell their productions and manufactures advantageously in Brazil.

FEABES, in Rural Economy, a term applied in some places to gooseberries; and which is sometimes written feaberies.

FEAGH, in Mining, signifies the refuse spar and rubbish of a mine.

FEAL, in Rural Economy, a term often used in the more northern districts to signify the turf or sward of grass land, when cut up or pared from the soil, for the purpose of forming fods. This fort of cutting or faying off the surface of old grass lands was formerly very common, but from its being found highly prejudicial, has been lately much laid aside, and should be wholly discontinued.

FEAL-Dike, a term applied in the northern counties to a fence which is constituted either wholly or partially of fods or feal cut from the adjoining grass land.

FEAL-Manure, in Agriculture, is that fort of earthly manure, which is produced from the decomposition and decay of the grassy surface of land which has been cut in the manner of feal, and thrown together in a heap for the purpose. When incorporated with a little dung it forms an excellent top-dressing for hay-lands.

FEAL, was anciently used for faithful; hence the tenants by knights service used to swear to their lords to be faithful and loyal; that is, faithful and loyal.

FEALE, in Geography, a river of the county of Kerry, Ireland, which rises in the wester part of the county of Limerick, and passes the towns of Abbeyfeale and Lixowel; after this it meets the river Caha, and with it forms the Cashin, a river which is navigable for eight or ten miles, and runs into the estuary of the Shannon.

FEALTY, Fidelitas, denoted, under the feudal system, an obligation on the part of the vassal to be faithful to his lord, and to defend him against all his enemies; and by the feudal law an oath of fealty was required to be taken by all tenants to their landlord, which is couched in almost the same terms as our ancient oath of allegiance; except that in the usual oath of fealty there was frequently a faving or exception of the faith due to a superior lord by name, under whom the landlord himself was perhaps only a tenant or vassal. But when the acknowledgment was made to the absolute superior himself, who was vassal to no man, it was no longer called the oath of fealty, but the oath of allegiance, in which the tenant swore to bear faith to his foreign lord, without any faving or exception. See ALLEGIANCe.

Fealty is usually mentioned as synonymous with homage; but it differs from it, as homage consists in taking an oath when the tenant comes to his land, and is done but once, being an obligation which is permanent, and binds for ever, which fealty does not.

They differ also in the manner of the solemnity; for the oath of homage is taken by the tenant kneeling, but that of fealty is taken standing, and includes fix things, which are comprised in the words inconst, tuation, vittal, boniham, facile, possible.

Inconst, that he do no bodily injury to the lord; tuation, that he do no secret injury in any thing which is for his defence, as in his house or castle; boniham, that he do him no injury in his reputation; vittal, that he do not damage him in his possessions; facile and possible, that he make it easy and not difficult for the lord to do any good which other wise he might do: all which is likewise comprised in Leg. Hen. II. Cap. 5.

He that holds land by this only oath of fealty, holds in the freest manner; for all, even those that have free, hold per seim et seduciam; that is, by fealty at the least.

This fealty is also used in other nations, as in Lombardy and Burgundy.

Indeed, as the very first creation of this tenure grew from the love of the lord towards his followers, so did it bind the tenant to fidelity, as appears by the whole course of the feud, and the breach thereof is los of the fee.

Hottonian, in his "Commentaries de Verba Feudalibus," shews a double fealty; the one general, to be performed by every subject to his prince, anfwering to our oath of allegiance; and the other special, required only of such, as in respect of their fee are tied by this oath towards their lords. We read of both alfo in the Grand Cautumary of Normandy, &c.

Fealty special was with us performed either by freemen or villains. By 17 Ed. II. f. 2, the form of this oath is appointed, and as now observed it is as follows: "I A. B. will be to you my lord C. true and faithful, and bear to you fealty and faith for the lands and tenements which I hold of you; and I will truly do and perform the customs and services that I ought to do to you. So help me God." The oath is administered by the lord or his steward; and though it is negatived in some manors, yet in copy-hold manors, where courts are kept, and copy-hold eftates granted, it is generally used. Every lord, of whom tenements are holden at this day, may, and ought to call upon his tenants to take this oath in his court-baron, because if it be long neglected he may lose his feignory, and the profits arising from eichates and other contingencies.

Fealty
P.1.0

FEAR

Fear is incident to all sorts of tenures, except from frank-almoine and tenancy at will.

FEAR, in Ethics, is the apprehension of some evil likely to befall us, attended with a desire of avoiding it. This passion has been found to be a preservative and purge.

"Fear, in Mythology, was a deity among the Greeks, and afterwards adored by the Romans, together with "Palæneus," its inseparable companion. When men were struck with the view of events, of which the canes were unknown, and which excited a terror into their minds that required foreign relief, they made a divinity of the disturbing passion itself, from which they sought to be delivered, by addressing to it vows and prayers. It is not possible to determine the precise time when they began to pay adoration to these two divinities. They were known, however, to the earliest poets of Greece. Hesiod, after having told us in his Theogony that fear was the daughter of Mars and Venus, adds, in the description of Hercules's buckler, that this god was represented upon it in his chariot, accompanied with fear and terror. Homer (II. 1.4.) gives these goddesses the same original. Accordingly, whenever he makes the god of war appear in battle, he gives him fear, terror, and flight for his retinue; he also places the same divinities sometimes upon the tremendous Αἴγας of Minerva, and sometimes upon the buckler of Agamemnon. (II. 11.) A divinity, so well marked by these two poets, and so formidable in herself, could not fail to command religious worship. Accordingly they had recourse to gifts and sacrifices, in order to appease and to be delivered from her. In a battle fought by Tullus Hostilius, the Alban, who had declared war to him, withdrew and joined the enemy. His men were at first dismayed, and all seemed to be lost, when that prince vowed to erect a temple to fear and palæneus; this vow produced its effects; the soldiers resumed their courage, and Tullus gained a complete victory. This event, which is the era of introducing the worship of these two goddesses into Rome, is marked upon two medals of the family of Hostilium. Upon the one is a head with the hair erect, the countenance raised towards heaven, the mouth open, and a terrible aspect, which are lively figures of the divinity whom the medal represented. The other exhibits a meagre face much lengthened, the hair laid flat; and a staring aspect. And this is the true portrait of palæneus, which is the effect of fear. According to Plutarch, the Lacedæmonians placed the temple of fear by the tribunal of the "Ephori," from a persuasion that nothing is so necessary as to inspire the wicked with fear of severe chastisement. Moreover, fear was joined in oaths with the other gods. Ἐφοβος, he informs us, that in the solemn oath taken by the seven chiefs of the Thracian expedition, in the midst of sacrifices, all of them holding their hands in the blood of the victim, swore by fear, by the god Mars, and by Belona.

FEAR, Putting in, in Law, is the criterion that distinguishes robbery from other larcenies. For if one privately steals his pen from the person of another, and afterwards keeps it by putting him in fear, this is no robbery, for the fear is subsistent (1 Hal. P. C. 534.) However, it is not necessary, though usual, to lay in the inditement that the robbery was committed by putting in fear; it is sufficient, if laid to be done by violence. And when it is laid to be done by putting in fear, this does not imply any great degree of terror or affright in the party robbed; it is enough that to much force, or threatening by word or gesture, be used, as might create an apprehension of danger, or induce a man to part with his property without or against his consent. (Voll. 128.)
The feasts were divided into days of sacrifice, and days of banqueting and feasting; days of games, and days of rest, or feriae.

There being but little history wrote, or at least published in those days; one end of feasts was to keep up the remembrance of past occurrences.

The principal feasts of the Jews were the feasts of trumpets, that of the expiation, of tabernacles, or the dedication, of the passover, of pentecost, and that of purification. The modern Jews have other feasts marked in their calendar of modern institution.

The Mahometans, besides their weekly feast, or sabbath, which is kept on Friday, have two solemn feasts, the first of which is called the Feast of Victims, and celebrated on the tenth day of the last month of their year; and the second, called Birkam. The Chinese have two solemn feasts in the year, in memory of Confucius, besides others of lesser note on other days of the year.

Feasts among us are either inmoveable or movable.

Feasts, inmoveable, are those constantly celebrated on the same day of the year; the principal of these are Christman-day, or the Nativity; the Circumcision, Epiphany, Candlemas, or the Purification; Lady-day, or the Annunciation, called also the Incarnation and Conception; All Saints, and All Souls; besides the days of the several apostles, St. Thomas, St. Paul, &c. which with us are feasts, though not firiis. See each feast under its proper article.

Feasts, movable, are those which are not confined to the same day of the year. Of these the principal is Easter, which gives law to all the rest, all of them following, and keeping their proper distances from it; such are Palm-Sunday, Good-Friday, Asc-Wednesday, Sexagesima, Ascension-day, Pentecost, and Trinity-Sunday. See Easter, Sexagesima, Pentecost, Trinity, &c.

The four feasts which our laws take special notice of are, the Annunciation of the blessed Virgin Mary, or Lady-day, the 25th of March; the Nativity of St. John the Baptist, held on the 24th of June; the feast of St. Michael the Archangel, on the 29th of September; and that of St. Thomas the Apostle, on the 21st of December; on which quarterly days rent on leases is usually reserved to be paid, 5 and 6 Ed. VI. cap. 3. 3 Jac. I. cap. 1. 12 Car. II. cap. 30.

Besides these feasts, which are general, and enjoined by the church, there are others local and occasional, enjoined by the magistrate, or voluntarily set on foot by the people; such are the days of thanksgiving for delivery from wars, plagues, &c. Such also are the vigils or wakes in commemoration of the dedications of particular churches. See Vigils, &c.

The prodigious increase of feast-days in the Christian church commenced towards the close of the fourth century, and was occasioned by the discovery that was then made of the remains of martyr and other holy men, for the commemoration of whom they were established. These, instead of being set apart for pious exercises, were abused in indolence, voluptuousness, and criminal practices. Many of them were intituted on a pagan model, and perverted to similar purpooses.

Feast of the Dead, is a solemn religious ceremony in use among the savages of America, some of whom thus testify their respect for the deceased every eight years; and others, as the Hurons and Iroquois, every ten years.

Feast is also used for a banquet, or a sumptuous meal, without any immediate view to religion.

The use of the word, in this sense, arises hence; that a part of the ceremony of many of the ancient festivals, both those of the Heathens and the agapes of the Christians, was good eating; though Mr. Haecchoos to derive the word from festinare, which in an ancient Latin version of Origens's Comment on Matthew, signifies to feast; or Ut vehemens illus Jesu festinet cum discipulis suis. In all antiquity, both sacred and profane, feasts were little more than religious feasts.

It has been often observed by authors, that there is no nation in the world comes near the English in the magnificence of their feasts. Those made at our coronations, infallibility, confecrations, &c. transcend the belief of all foreigners; and yet it is doubted whether those now in use are comparable to those of our forefathers.

The Persians never discourse and deliberate of their most important affairs but in the middle of their feasts.

FEATHARD, in Geography, a poet town of the county of Wexford, Ireland, which was formerly flourishing, and sent two members to parliament, but which has now fallen to decay, and has lost its privilege as a borough by the union. It is a seaport, separated by a small neck of land from Waterford harbour, 81 miles S. by W. from Dublin, and 14 S. from New Ross. See FEATHARD.

FEATHERS, in Comparative Anatomy, constitute the peculiar covering of the chiefs of birds. In no other tribe of animals are they met with; for the plumes which belong to some of the lepidopterous insects are different from the feathers of birds, both with respect to their structure and mode of growth. No bird is entirely deprived of feathers, although some species want them on certain parts of the body. The turkey and vulture have the head and part of the neck uncovered. The ostrich and the wading birds have bare thighs: those birds which have creces, combs, or pieces of flesh on the head, have those parts without feathers, as in the bald coot, several gallinaceae, &c. The apododies want feathers even on the wings. Many birds have patches or spots about the sides of the head, upon which there are no feathers.

The feathers which make the proper clothing of the bird are of two kinds, the down and common short feathers; the former is placed under the common feathers: it gives an entire covering to some water birds at a very early age; of this the young goose is a familiar example. The down is designed to defend the bird against cold and wet; and hence it is so abundant upon the lower surface of those birds that frequent the water.

Although the common feathers cover the whole body, they do not grow from every part of the skin; they are thickest upon the shoulders and loins, along the under part of the neck and breast, and do not extend upon the lateral lines of the neck or breast, or about the umbilicus. This arrangement, and their being directed downwards and backwards, allows them to cover the body more neatly, and to remain unruftled during the motion of the bird.

The large feathers, or quills, situate upon the wings and tail, should rather be considered as instruments of motion than as an integument: thus we find them strong and unyielding in their texture in birds of flight, more especially those that have leavy bodies, as the swan, goose, turkey, &c. while they are wanting in the wings of those birds that do not fly, as the ostrich, apododies, &c.

There are other long feathers that differ both from the quills and common feathers, with respect to their structure and position. Of these we may mention those of the creft of the peacock, and some of the crane kind, the hypochondriac feathers of the birds of paradise, the rump feathers of
FEATHERS.

of the peacock, &c.

The ornament, which the feathers seem designed for ornament alone.

There are many other varieties of feathers, but as these are more the concern of the naturalist than of the anatomist, we shall not dwell upon them at present, and hereafter only notice such peculiarities in the external appearance of feathers as illustrate the structure of these parts.

The anatomy and mode of growth are essentially the same in all kinds of feathers; but we shall take our description chiefly from the large feathers, or quills, as being the most convenient for the purpose.

Previous to the appearance of the first feathers, the skin of birds is in a degree covered with hairs, except under the belly: these grow in tufts, or fasciculi, each containing about ten or twelve hairs. Cuvier states these tufts to be implanted in a bulb or follicle, which, as he conceives, contains the rudiments or sheath of the feather. When the sheath is protruded from the skin, it carries with it the fasciculus of hairs, which then appears to arise from its extremity. In general, the hair very soon falls off from the feather, but in some of the accipitrine birds it is found attached for a considerable time to the end of the feather, resembling fine down.

All feathers are originally contained in tubular sheaths: these penetrate the skin, and become apparent, usually a few days after the bird leaves the shell. The quills are first observed; after these, the down makes its appearance, and then the common feathers. These last are found to be arranged in a quincunx order.

The structure of the sheath is exceedingly curious: it is round, or tubular; the extremity, which is alluded to in the skin, is blunt and perforated, in order to give passage to the bulb or vacular part of the feather; the external end is originally close, and of a pointed shape. The pustules of this tube appear to be of an horny nature; although they are thin and extremely fragile, it readily splits into lamina, more especially at the external extremity; it is thicker, felter, and lea brittle towards the end connected with the skin.

The root of each sheath is accommodated in a corresponding excavation of the integuments: this is lined by a reflection of the cuticle, which appears, after reaching the bottom of the cell, to return outwards, by piling on the proper sheath of the feather, in which situation it is extremely thin and delicate. The cells which enclose the sheaths of the feathers are usually very deep in the wings and tail; their internal lining is also strong in that situation, and they adhere to the periodium.

If the sheath of the feather be opened at a very early period, it will be found to contain a vacular pulp, (of which more hereafter); and around this may be seen some colouring matter, in a soft and almost liquid state, which, if examined, will be found composed of a number of little thin processes, or laminae, already possessing the form of the bars of the future feather; there are therefore the first parts which are produced; they soon acquire more strength and firmness, and become attached to the flaps or flake of the feather, which is the part next secreted.

As soon as the point of the feather is completely formed, it perforates the external end of the sheath, which is easily ruptured. The feather in this way gradually increases, to accommodate which the sheath also enlarges, and becomes on the feathers of the wing and tail a considerale tube.

In proportion as the feather is formed it palls out of the torn end of the sheath, which becomes further lacernated by this means, and dries from exposure to the air, and falls off in sheddy plates or scales, leaving its original structure to have been laminated.

The bars, while enclosed in the sheath, are coiled round, in order to gain room; but on pulling out unfold and take their proper figure.

After the bars and quills of the feather are entirely formed, the tubular part, or that which in quills is called the barrel, is produced. Cuvier describes this part as being formed by the conglodiation and drying of the sheath in which the shaft grew; but it appears to us to be secreted, like the other parts of the feather, by the vacular pulp. The tube, in a full-grown feather, always appears to be the continuation of the back part of the shaft. The sheath, however, adheres more closely to the tube than the result of the shaft, and hence that sheddy membrane which is observable on the barrel of a quill before it is cleared.

The vacular substance, or pulp, is often already alluded to, possessing a very singular structure. Cuvier calls it a gelatinous cylinder; but although almost so soft and pulpy as to merit that name, it is an organised body, constituting of numerous cells, and provided with a large supply of blood.

An injection of a coloured fluid from any of the surrounding arteries renders the pulp of the feather entirely red, and seems to pervade every part of it, as if it was fixed into it, or extravasated in its substance.

We have failed to trace any branches of nerves into the pulp, although they can be easily identified as far as their origin or root: in this circumstance it resembles the vascular bulbs of hair and quills, and the pulp of the teeth, into the substance of which, we believe, no peron has yet clearly pursued the branches of nerves.

The pulp, after fulfilling its purpose, viz. the secretion of the feather, undergoes a singular change of structure: it loses all vacularity, becomes perfectly dry and chalky, and sets on the appearance of a number of empty membrous cones, or funnels, infiltrated one into the other. This change has been ascribed to the part being dried by exposure to the air; but, that it is effected by a process of abstraction, and by the coagulation of vacular action in the arterial branches, is fully proved by the channels and the disappearance of all colour in the degenerated pulp. The above change goes on gradually, beginning at the extremity of the pulp, fartest from the root of the feather, and keeps regular pace with the growth of the feathers.

As the pulp dies or degenerates along the grooved side of the shaft, it is rubbed off; but in the tube of the feather it is preferred, and makes that well-known jointed membraneous body which we take out of the barrel of the quill in making a pen.

The conversion of the vacular pulp into dry membranos cells necessarily produces a considerable vacancy in the tubular portion of the feather, which is supplied by air. The means by which this air is obtained, and its chemical composition, have not heretofore been known. In making some experiments, with the view of analysing the air contained in quills, we discovered how it is admitted into the tube. Some quills, plucked from a living goose, being introduced into a quicksilver bath, and their ends being cut off while in the bath, a sufficient quantity of air was obtained by turning the open end up into an inverted jar. While this was doing, it was observed, that if the open end of the quill was pulled downwards into the bath, the quicksilver rode in the barrel, as in a thermometer. This led to the conclusion, that there must be an opening through which air could pass out, and of course into the barrel of the quill: some further examination detected a foramen situated at the upper part of the barrel, just where the groove
FEATHERS.

The cavity of the barrel is continued a little way into the back part of the shaft, in which it is gradually lost, and in some birds of flight, as the eagle, hawk, flock, &c. it is continued for a very considerable distance into the shaft.

No part can be better contrived for uniting the advantages of strength and lightness than the barrel of quills.

The shaft is likewise composed of a circular and a longitudinal layer, or plate; it, however, appears opaque, in consequence of being filled with a pithy substance. This shaft is often of a white colour; it resembles very much the medullas of vegetables in a dried state, but is more compact and close in its structure. The shaft is the principal part of most feathers. The back, or external side of the shaft, is smooth; the opposite, or inner surface, presents a groove, which runs along the middle of the shaft for its whole length, giving it the appearance of having been originally composed of two pieces. The two sides, or intermediate surfaces, of the shaft, are lighter in their texture than the external and internal surfaces.

The barbs are implanted along the two edges of the external surface, or back of the shaft. Upon the existence, size, colour, and form of these, chiefly depend the character and appearance of the feather.

The barbs, when minutely examined, are seen to be composed of a framework from the edge of their posterior surface, exactly in the same manner as they arise themselves from the shaft; every barb, therefore, may be properly considered as a shaft in miniature.

Sometimes both the barbs and barbules are wanting, as in the quills of the currle, of which the shafts are long, smooth, and pointed, resembling the spines of the porcupine.

In loose floating feathers, as those of the offrich, &c. the barbs are not closely applied to each other, and give off superficially barbules on each side, which have no immediate connection with one another. In general, however, the barbules of one barb are interwoven or interwoven with those of the next barb, so that the feather presents a continuous surface to the air or water. When the feathers are ruffled, the connection of the barbules is destroyed, and the adjustment of the feathers consists in laying the barbs nearly the one beside the other, by which the barbules fall into each other's interstices.

The adherence between the barbs of the wing-feathers in many birds of flight and water-birds is rendered very firm. In the geese, for instance, the barbs of the quills are plates or laminae, which have each a concave and convex surface. The barbs, therefore, are received one into the other and are besides united by a row of barbules along their upper or posterior edge. A degree of the same structure is found in the wings of all birds that fly. The intention of the barbs adhering together is the same as the feathers being laid one upon another; by both these circumstances the bird is enabled to present an unbroken surface to the influence of the air during flight, and defend its body from being wet. The quills of the wing and tail appear to have, in general, but one row of barbules, which being placed obliquely upon the posterior edge of the barbs, are enabled to pass across and touch each other.

The feathers that form the crest of the peacock have no barbules in their middle and inferior part. The feathers of the crest of the baleare crane are twisted in a spiral manner, and their barbs are only fine hairs. The crest of the little egret (ardea garvazetta) is composed of similar feathers. The tuft of feathers at the bottom of the neck of the male turkey may be also regarded as barbules.

The barbules are long, distinct, and unattached to each other.
other in the hypochondrine feathers of the birds of paradise, the rump feathers of the peacock, those on the thighs of the myteria and balearic crane, the feathers of the toucan, and those placed around the ears of the owl, &c.

The feathers of the nocturnal birds of prey have the barbs covered with long silky down, from which arises the flow and slant flight of those birds so necessary to their habits of life.

The feathers of the buffinches, the purple-throated fly-catcher (Myiarchus rubricollis), the Tangara fpecticolor, those of the head of the red-headed manakin, and of the rampahotes monota, &c. have the barbs fine and silky.

The rump-feathers of the golden thrush, those of the tail of the jay, and of the neck of the common duck, have the barbs quite close, and furnished with long, fine, soft barbules, disposed upon the surface in such a manner as to resemble felt.

In some foreign birds, as the humming-birds, the saffron and trogons, paradisaea aurora, &c. the barbs of the feathers are broad and smooth upon the surface, and being of a brilliant colour, produce the appearance of polished metals.

In the ruby-necked humming-bird the feathers of the head and throat, and those of the head and belly of the amethystine humming-bird, are so extremely brilliant as to resemble polished emeralds, as the names of these birds imply. This effect is produced by the barbs which terminate the shaft being so very dense and highly polished. The barbs of the tail-feathers in the wood-pecker are singularly strong, it being by the tail that these birds sustain themselves in a great measure when taking their prey.

The appearance of sealing-wax on the wings of the waxen chatterer (ampelis garrulus) arises from the end of the shaft without barbs, and formed into a solid round disc.

In the down of all birds the shafts are extremely fine and delicate, and often imperceptible. The barbs are long, distinct, and floating: and the barbules are long, loose, and silky.

The chemical composition of feathers agrees so nearly with that of hairs, that we need not enter into particulars upon this part of the subject. Feathers, however, contain a less proportion of mucilage, and receive less moisture from the body: but although feathers are not dry, even when attached to the living bird, they lose much of their pliancy and freshness after being some time plucked.

Plate III. Fig. 1. The anatomy and mode of growth of feathers. Fig. 1. represents a portion of skin of a bird recently hatched, upon which the hairs are seen that precede the appearance of the feathers. Fig. 2. shows one of the young feathers, bearing on its extremity some of these hairs. Fig. 3. is a portion of the wing on which the feathers of the quills are shewn of different sizes. The cells are laid open, to expose the roots of the feathers and the vascular pulps passing into them; a the substance of the wing; b b b b the feather-feathers; c c the pulps penetrating the base of the feathers; d d the lining of the cells turned back. Fig. 4. is the end of a feather, showing the foramen by which the pulp enters the feather. Fig. 5. exhibits the feather ruptured at its external extremity, through which the end of the feather is seen to protrude: a the feather, showing the appearance of being composed of circular fibres: b the feather-

Feathers. The chemical composition of feathers appears, by Mr. Hatchett's excellent experiments (Phil. Trans. vol. xc.), to be nearly the same as that of hair, nail, and cuticle, and consists of inspissated albumen mixed with a very minute portion of gelatin, and a little animal oil. The proportion of inspissated albumen is so large, that feathers may be boiled for many days in water with scarcely any loss, the albumen being insoluble in this liquid, and the gelatin being so small that the liquor gives no precipitate with tan, and very little with nitro-muriatic of tin.

Feathers, in commerce, make a considerable article, particularly those of the ostrich, heron, swan, peacock, goose, &c. for plumes, ornaments of the head, filling of beds, writing pens, &c.

Geese are plucked in some parts of Great Britain five times in the year; the first plucking is at Lady-day for feathers and quills; and the same is renewed for feathers only four times more between that and Michaelmas. (See TÉN and GOOSE.) In cold feasons many geese die by this barbarous custom. Those feathers that are brought from Somersetshire are esteemed the best, and those from Ireland the worst. Elder down is imported into this country from Denmark, and is furnished by those ducks that are inhabitants of Hudson's bay, Greenland, Iceland, and Norway: Hudson's bay also affords a very fine feather, supposed to be of the goose-kind. The down of the swan is brought from Dantzick, whence it has also a great quantity of quills and long feathers. The best method of curing feathers is to lay them in a room in an expositu to the sun, and when dried to put them in bags, and beat them well with poles to discharge the dust.

Feather-bed.

Feathers, dry-pulled, } See Bed.

Feathers, sealed, } See Feathers.

Feathers, in agriculture, are sometimes employed as manure, where they can be collected in any quantity: but, when used in this way, the pens, flumps, &c. and other matters of them are chiefly the parts had recourse to, being procured from the shops of the poulterers, &c. in large towns.

Feather, in the manure, a sort of natural frizzling of the hair found in many parts of a horse's body, but more commonly between the eyes. In some cases it resembles an ear of barley, and in others an oilet-hole. Many are of opinion, that when the feather is lower than the eyes it is a sign of a weak eye-sight; but this remark is not certain.

Feather-edged Boards, in rural economy, are such boards as are lown thinner on one edge than the other, in
order to let over each other, being much employed in building small farm-sheds, &c. where great expense is to be avoided.

Feather, Prince's, in Gardening, a common name of a species of the amaranthus. See AMARANTHUS.

Feather, Roman, called in French de Remaine, is a feather upon a horse's neck, being a row of hair turned back and raised, which forms a mark like a sword-blade just by the mane.

Feather, Nid, in the English Salt-works. See Nid. Feather, Sec. See Gorgonia.

Feathers, Feather, in Natural History. Different writers have described organic remains, or fossils, found in the strata, under the name of feathers, ortholithi, &c. Most of the drawings of pretended fossil feathers which we have seen, have had a considerable resemblance to the iron-stone fossil which Mr. Parkinson has figured in the fifth plate, (fig. 5.) of the first volume of his Organic Remains, and he considers it as a kind of leaf or vegetable production, and we think with good reason.

Feather-out, in Geology, is a term which has been of late used by Mr. W. Smith and others, in describing such strata as do not end abruptly, or in the face of a sudden hill, but whose lower beds advance fo far beyond the superior ones, as to end by imperceptible degrees; a cafe which frequently occurs with some particular strata, and gives much trouble to a mineralogical surveyor in tracing their superior and inferior edges, and describing the surface they include on a map. In denuded districts, it is very common to find strata, which are of very uniform hardness, feathering-out fo far, that it is difficult to trace their limits, except by the slight and almost imperceptible tablets which the harder beds occasion, as mentioned by Mr. Farey, Philosophical Magazine, vol. xxxiii. p. 262.

FEATHERED COLUMBINE. See Thalictrum. Featly, Daniel, in Biography, was born at Charlton in Oxon, in 1582. In 1594 he was admitted a scholar of Corpus Christi college, where he took his degree of B. A. in 1602. He purfued his theological studies with great arduous; and on account of his learning and polished manners was appointed chaplain to the eminently sent to the court of France, where he resided three years, and obtained a distinguished reputation as a preacher. Upon his return, in 1615, he took his degree of B. D. and was prebented with the rectory of Northill in Cornwall, and immediately after was appointed domestic chaplain to Dr. Abbot, archbishop of Canterbury, who in a short time presented him with the rectory of Lambeth. This was followed by other preferments of considerable worth. In 1625 he married, and quitted the palace at Lambeth for a house at Kemington, of which he became possessor in right of his wife. During the civil wars he had nearly lost his life by some enthuflasical folders who had conceived the opinion of his holding popish principles. Though he twice escaped their fury, his property was very much deteriorated by their ravages. In 1643 he was nominated one of the assembly of divines, not only on account of his learning, but because he was zealously attached to the Calvinistic doctrines. This latter circumstance induced the assembly not only to treat him with great respect, but to permit him to speak freely his own opinions in favour of "episcopacy," and against the "covenant." He was by his own friends deemed orthodox and loyal; but lord Clarendon and others will not allow him that praise, on account of his attending against archbishop Laud when on trial. Lord Clarendon afferts that the king lent him a letter commanding him to follow the example of the other episco-

pat divines who had quitted the assembly, which occasioned his writing to archbishop Usher, assigning reasons why he could not obey the royal mandate. This correspondence was by some means laid before parliament, and was the ruin of Featly; who was found guilty of a breach of an ordinance which prohibited the members of the assembly from divulging their opinions without consent of one or both houses. He was accordingly deemed a betrayer of the parliamentary cause, imprisoned, tried of his preferments, and expelled the assembly. His spirits were not broken by this usage, but his health began rapidly to decline; he supplicated parliament to be permitted to exchange his prison for apartments in Chelsea college, for the sake of change of air; this favour he obtained, but it was then too late; he died in 1644. His character is given in few words by Wood, who says that "he was most seriously and fondly pious and devout." Neal's Hist. of Puritans by Toussin.

FEAZING, at Sec, is the raveling out of the cable or any great rope at the ends.

FEBABO, in Geography, a town of Africa, and capital of a district in the Libyan desert, inhabited by Tisbury, 160 miles S. of Angola. N. lat. 26° 50'. E. long. 22° 5'.

FEBRICULA, in Medicine, the diminutive of febris, signifying a flight fever, has been sometimes applied to the hectic fever, and sometimes to the low nervous fever, so denominated by Dr. Huxham. In the latter acceptance principally we have a treatise on the "Febricula, or Little Fever," by sir Richard Manningham. See NERVIS Fever.

FEBRIFUGE, from febris, fever, and fugus, I drive away, a term which is applicable to every remedy for fever, but was originally employed to denote the quality of those medicines which were believed to have some peculiar or specific power in arresting febrile diseases. The word, however, is now seldom employed; because no remedy possess'd of any specific anti-febrile power is known. Antimonial medicines, indeed, and the neutral salts, in consequence of their diaphoretic quality, are sometimes called febrifuges; but the term is not applied to them with more propriety than to the purgatives which are given, or even to the gruel which the patients drink. If there be a remedy, which can be said directly to suppress febrile action, it is, we believe, cold water, freely applied to the surface, and taken internally. (See Cold.) Hence the term "febrifugum magnus," used a century ago by the renowned Dr. Handeck, although it called forth the raillery and ridicule of the faculty, was, perhaps, not less just than emphatical. (See his treatise, entitled "Febrifugum Magnum, or Common Water the best Cure for Fevers," London, 1723.) The cinchona, or Peruvian bark, has been termed the greatest febrifuge, probably on account of its efficacy in the cure of intermittent fevers, or agues, but, freely speaking, it is a preventer in these cases; since its efficacy conflits in preventing the return of the fever, by strengthening the body in the interval; and not in allaying the fever itself, over which it has no power. The secret preparation of antimony, which Dr. James employed, and which was insufficiently popular for many years, as a febrifuge, to enrich the inventor and his family, possess'd no other power in allaying fever, than its operation as a purgative and diaphoretic. See Fever.

FEBRIS. See Fever.

Febria Amphemerina, from 4p., and 8p., a day, an appellation given by some of the moderns to that form of remittent fever, in which similar remissions and exacerbations occur daily, in order to distinguish it from the daily inter-

mitten.
mittent, which is called febris quotidiana. (See Sauvages, Nofol. Method. clafs ii. order ii. genus 6.) It has been also denominated by Latin writers quotidiana continua. (See Senecutus de Febribus, lib. ii. cap. xiv.) “Ea febris perpetuo quidem durans,” says this author, “et nunquam ad anginosus deveniens, singulis tamen diebus exacerbations suas habens a pituita fanguini permixa.” It is the fehneces or continent fever of Morton, erroneously fo called: and the febris laticia of some writers in barbarous Latin. The terms amphiemena, amphemeria, as well as catheremina, and melbemerina, derived from the fame root, with the addition of the prepositions exta and metus, were applied by the Greeks to this fever, as well as the quotidian intermittent. See REMITTENT.

**FEBRIS Anginosus.** A term applied to fevers accompanied by a sore throat, or angina. See CYNANCH.

**FEBRIS Defcatoria,** the fame with depuratoria, a term used by Sydenham, Queuey, and other humoral pathologists, to denote such a fever as terminates by a critical discharge, which was supposed to rid the fystem of morbid humour. See DEPURATORIA.

**FEBRIS Ebrodiana.** See ELODES.

**FEBRIS Ephemeria.** See EPHEMA.

**FEBRIS Epilepsia.** See EPIALOS.

**FEBRIS Gastrica,** an application applied to thofe modifications of fever in which the foals and bowels are more particularly affected; as with pain, diarrhœa, especially when the ftoals are of a morbid appearance, or fett, &c. (See Burferinus, Infl. Med. Prat. vol. i.) The fame variety of fever has also been denominated febris fiteronis, and by Queuey fevere excrementeuse. (Traite des Fievres, tom. ii.)

**FEBRIS Remittientia.** Synonyme, the fame with femiterian. See FEVER, SEMITERIAN.

**FEBRIS Lyphria.** See LYPIRIA.

**FEBRIS Phlyicides.** From &tau; x, febile chill, called also febris horrida and horripilis, a variety of fever in which the rigors or chills are frequent. See PHRYCIDENS.

**FEBRIS Synoche.** Also Synoche, different modifications of continued fever, the former term being applied to the milder, the latter to the more violent, inflammatory or ardent feecies. See thofe words.

**FEBRIS Trizophonia,** a remittent fever with the remissions and exacerbations occurring only on the alternate days: it differs from the tertian intermittent, as the febris amphiemena differs from the quotidian. See REMITTENT.

**FEBRIS Tetrazophia,** a remittent fever, with the remissions and exacerbations on the fourth day from the commencement, that is, with an interval of two days between each remission: and differing from the quartan, as the preceding article from the tertian intermittent. The trizophia and tetrazophia have also been denominated tertiana continua, and quartana continua. See REMITTENT.

**FEBRIS Typhoidia.** See TYPHUS.

**FEBRU.,** or FEBRUARIUS, in Mythology, an application given to Juno as the goddess of purification, and as presiding over women in the pains of labour and childbirth. She was so denominated, because the pontiffs paid her a peculiar worship on the first day of February.

**FEBR.,** in Antiquity, a feast held by the Romans in the month of February, in behalf of the manes of the deceased.

Macrobius tells us that sacrifices were here performed, and the falt offices paid to the deities of the dead. (Saturn. lib. i. cap. 13.) And from this feaft it was that the month of February took its name.

The defign of these sacrifices is somewhat controverted: Pliny says they were performed to render the infernal gods propitious to the deceased; though some of the moderns have imagined that they were intended to appease the deceased themselves, and were offered immediately to them as a sort of devote. What confirms the former sentiment is, that Pluto himself is surnamed Februus. They lided twelve days.

The word is of an ancient standing in the Latin tongue; from the very foundation of the city we meet with februus for purifications, and fefervare, to urge or purify. Varro, (De Ling. lib. v.) derives it from the Sabines; Voifius and others from fiero, I am hot, because purifications were chiefly performed with fire and hot water. Some go higher, and even deduce the word from θέρα πορίς, in the Syracide and Arabic it has the fame signification with februus, or febrilis, and might probably likewise signify to purify; for placear, in Arabic, denotes a preparation given to women in child-bed to bring away the after-birth, and other impurities remaining after delivery, much as among the Romans, who gave the fame Februus to the goddesses supposed to preside over the delivery of women. Ovid, Fast.

**FEBRUAR.** FEBRUAR., in the Roman Chronicle, the second month of their year, fo called from februus, a feast held therein.

In the first ages of Rome, February was the laft month of the year, and preceding January, till the decemviri made an order that February should be the second month of the year, and come after January. See BISECTILE.

**FECAMP.** In Geography, a town of France, in the department of the Lower Seine, and chief place of a canton, in the district of Le Havre, nine miles S.W. of Dieppe. The place contains 7255, and the canton 14,981 inhabitants, on a territorial extent of 82.1 kilometres, in 13 communes. The principal commerce consists of linen, fene, lace, leather, and hats: the shipping employs many vessels: and smaller boats lie along the coast. N. lat. 49 46’. E. long. 1° 28’.

**FECES.** See FACES.

**FECIALES, or FOLCIALES,** an order of priets or officers confulting of twenty persons, among the ancient Romans, appointed to proclaim war, negotiate peace, &c. Februus derives the word from fcrio, I strike, as fereus februs dignities to conclude a treaty; and accordingly, instead of feeciales, he would have it wrote fociales. Others derive it from fudus, which was anciently written seditus: or from jurare, faith; others from fæco, fæci, I make, &c. because they made war and peace. Voifius chooses to derive it from fæco, of the verb fæci, to speak; in which sense the fæciales should be the name with oratores; which fentiment is also confirmed by the authority of Varro, who fays they were called indifferently, fociales and oratores. De Vet. Popul. Roman. lib. ii.

The fociales were a fort of heralds or kings at arms, who, when the Romans had any dispute with their neighbours, were fend frit to demand the thing pretended to be unfurped, or require satisfaction for the injury alleged to be done. If an answer was not returned by them that was satisfactory to the people and the Senate, they were dispatched again to declare war, and the like in treating of peace, the fociales being the only persons appointed to negotiate between the Senate, &c. and the enemy.

Plutaroh, in the Life of Numa, and Halicarnasus, lib ii. obferves, that they were first instituted by that prince. The latter adds, that they were chosen out of the best families in Rome; that their office, which was reputed a frot of fæcundatum, or priesthood, only ended with their life; that their persons were faced and immovable, as those of other...
priests; that they were even charged to fee the republic did not declare war unjustly; that they were to receive the complaints and remonstrances of nations who pretended to have been any way injured by the Romans; that if those complaints were found just, they were to seize the criminals, and deliver them up to those they had offended; that they were invested with the rights and privileges of ambassadours; that they concluded treaties of peace and alliance, and took care they were executed; and, lastly, abolished them if they were found not to be equitable. Livy, lib. i. cap. 24. describes their institution to Ancus Martius, in the year of Rome 144. See also Aul. Gell. lib. xvi. cap. 4.

But Varro affirms us, that in his time most of these functions of the feecles were set aside; as those of the ancient heralds at arms are among us at present; though Plutarch observes, that they had still some authority in his time.

The feecles were crowned with vertebra, vertebra, when they went to declare war; usher's head was covered with a veil, over which the crown was applied; in this equipage they proceeded to the frontiers of the new enemy's country, and threw a bloody dart or javelin into the ground within the same. In Livy, and other ancient authors, we have the formula used in such declarations.

FECKENHAM, JOHN DE, in Biograph., the last mitred abbot who sat in the house of peers, was born of poor parents, who resided in a mere cottage on Feckenham forefie, in Worcestershire, from which place he derived his name, that of his family being "Howman." His natural abilities induced the parish priest to educate him, and then to obtain for him an admittance into the monastery at Evesham. When he was eighteen years of age, he was sent to Gloucester college, Oxford; where he refined a sufficient time to improve himself in academical learning, and then he was recalled to his abbey. Upon the dissolution of this place, in 1536, he had a yearly pension of one hundred florins allowed him during his life. He now returned to Oxford, and in a short time took his degree, and was appointed chaplain to Dr. Bell, bishop of Worcester. He was afterwards chaplain to Bonner, bishop of London, and, in 1539, when Bonner was deprived of his bishopric, his chaplain was committed to the Tower of London. The cause of his imprisonment was first promising, and then refusing, to administer the sacraments after the Protestant manner. He was afterwards, to use his own expression, "borrowed from prison to take part in different disputations on the points at issue between the Protestants and Papists," which were held at the houses of some persons of high rank, and was carried into Worcestershire, where he still held a benefice to maintain solemn public debates with Hooper, the bishop of that diocese. These disputations producing no change in his religious opinions, he was most shamefully remanded to the Tower, where he was kept till the accession of queen Mary, in 1553. He was now made chaplain to the queen; and also chaplain to Bonner, by whom he was preferred to the prebend of Kentish Town, in St. Paul's cathedral. He was deputed to Lady Jane Grey, to attempt her conversion two days before she was executed, but his mission proved to be entirely fruitless. From the prebendary of St. Paul's, he was, in the year 1554, raised to the deanship; and received other valuable preferment. In the same year he was appointed to dispute against Cranmer, Ridley, and Latimer, before those exemplary characters were committed to the flames by order of the bloody queen, and her still more infamous prelates. Feckenham, it is believed, was no party in these horrible crimes, and abhorred even the office of attempting to change the opinions of men, whom in his heart he could not but respect. He was kind and humane, and distingushed himself in performing a thousand good offices for the afflicted and persecuted Protestants. He went so far in this cause as to offend his bigoted misfref, who probably began to be suspicious of his principles. In 1556 he was created D.D. out of respect to his learning, piety, benevolence, and other virtues, without being called on to perform the accustomed exercises. In the same year, queen Mary restored the monastic foundation of Westminster Abbey, and appointed Feckenham abbot of the same, with episcopal power over the monks. When Elizabeth came to the crown in 1558, she did not require to be reminded of her obligations to this worthy man, who had pleaded for her liberty when imprisoned by her sister, but offered him the highest promotion in the church, provided he could conform to the changes then in contemplation. This his conscience obliged him to refuse: he went much farther; he thought it his duty to oppose the reformation in the house of peers, where he sat as a mitred abbot in the lowest place on the bishop's form. For his steady attachment to his own principles, and for the eloquence with which he pleaded against the innovations of the times, he was committed to the Tower in 1560, and continued in that prison till 1563, when he was removed to the custody of Dr. Horne, bishop of Winchester, who probably engaged to convert him from his errors: a task much too difficult for the prelate, who, it appears, in a few months, sent him back to the Tower. Shortly after, at the solicitation of his friends, he was removed to the Marshaile, from which he soon obtained a complete discharge. In 1574, he was again imprisoned, and released upon giving bond for his appearance when called on: It must be observed, that this mode of giving and taking bond is often referred to as an apology for the government, when they know that they have stretched the limits of their power, and by submitting to give bond or bail for appearance, the aggrieved and injured person, in truth, judiciously the conduct of those who have inflicted the injury. Feckenham, at length, wearied with frequent prosecutions, acknowledged the queen's supremacy, but could be persuaded to go no farther, and he was again imprisoned at the castle of Walsingham, where he spent the remainder of his days, and died in 1585. Camden calls him "a learned and good man, that lived long, did a great deal of good, and always solicited the minds of his adversaries to benevolence." Fuller styles him a man cruel to none, courteous and charitable to all who needed his help. Burnet and others bear their testimony likewise to the excellence of his character. Biog. Brit.

FECSULA, in Chemistry. This term is usually applied to any pulverulent matter extracted from any part of a vegetable, simply by breaking down its texture, washing with water, and sublimation. It is therefore a most minutely divided sublimate, capable of being suspended in cold water, but not dissolved. The most important of these is the amylaceous fecula, a nutritive inodid sublimate contained abundantly in grains, seeds, and roots, united with an extractive and mucilaginous matter, sometimes with gluten and vegetable albumen, with mucilage, and oil. Of roots, the tuberous and bulbous are those which contain the most fecula; the nodulous part of trees and plants also abound with it.

The extraction of the fecula is very simple, but it cannot always be obtained free from colour and taste. The root
or grain must first be broken down into a pulp by rasping or other mechanical means, and then washed with cold water, which becomes immediately turbid. This is to be halfly poured off from the fibrous part of the pulp through a coarse sieve, and allowed to remain at rest for a few minutes, during which the fecula subsides to the bottom in the form of a very fine close-grained powder, but without any tenacity or cohesion, and of the consistence of very fine wetted sand. The supernatant liquor always remains somewhat turbid, and generally coloured with mucilage or extract. The fecula should be washed repeatedly with abundance of cold water, till this comes from it quite insipid and colourless.

It should be observed, however, that it is only from a few of the grains and roots of plants that the extraction of the fecula is thus easily effected; for where this substance is intimately united with oil and mucilage, as in the almond, and many other kernel seeds, the whole is rendered uniformly diffusible in water nearly in an equal degree, and the fecula will not be deposited pure by mere submersion, nor indeed is there any way by which it can be obtained very pure when in this combination.

The chemical properties of pure fecula (taking fine flarch as an example), are the following:

1. It is a white powder, nearly, if not entirely, insipid, somewhat adhering to the tongue, but not soluble in the mouth. When examined with a lens in a good light it appears composed of small semi-transparent grains, with a fatty gloss, and somewhat of a crystalline arrangement. It is not easily moistened with cold water, but when rubbed with this fluid it makes an incipient mass, which, on drying, cracks into small pieces. When wetted and kept in a moderate warmth, the mixture slightly ferments and turns sour.

2. Boiling water, however, acts very differently on fecula, for it dissolves that substance speedily and totally into a thick, tenacious, transparent jelly, which becomes still more tenacious by long boiling, as is seen in the ordinary domestic use of flarch. When liquid flarch is slowly dried, it shrinks in every direction as the water evaporates, and finally becomes a transparent brittle substance, exactly resembling gum-mucilage.

3. Most of the acids dissolve fecula with ease, especially when affixed with heat, and with nearly the same products and appearances that attend the action of the same acids on mucilage.

The alcalies also dissolve fecula readily, but the precise chemical effects of these agents have not been much examined.

1. When flarch is heated strongly in the open air, it first becomes yellow, then brown, and red, softens, puffs up, exhales a white pungent acid smoke, and leaves a bulky soft coal. The products of its distillation per se are, a water loaded with pyromusaceous acid, some drops of a red-brown oil, much carbonic acid, and hydrocarbonous gas. The ashes of the coal, when fully calcined, contain a little potash and phosphat of lime.

2. Starch, when kept dry, and excluded from the air, will remain long unaltered, though at last it runs into clots, and acquires a lour mudy smell.

3. In chemical properties the amyaceous fecula bears the strongest resemblance to mucilage.

Of the green Fecula of Plants.—This substance, which has been the subject of much curious investigation, must be carefully distinguished from the amyaceous fecula last described, to which indeed it has no other resemblance than in the mere circumstance of being sometimes obtained in a fine powdery form by spontaneous submixture.

Many of the green mucilaginous vegetables, when pressed mo-
female ones, from the medullary substance, be founded in truth, is not to our present purpose. There are many facts and analogies which support that theory; and what theory, in the hands of an ingenious man, is destitute of such supports? The idea is altogether speculative; and the doctrine of vegetable impregnation, which we shall now briefly explain, is entirely independent of it.

As far as the flowers of any plant have been clearly ascertained and deflected, they are found to consist of two essential kinds of organs, the stamens and pistils. The essential part of the former is the anther, a capular body containing the pollen; which, left even after it is dislodged from the anther, is found to be also in general capular, though in some instances of a glumaceous feature. In either case the pollen finally discharges something, in the form of a vapour or elixir, by which its final purpose is answered. The essential part of the pistil or pistils, on the other hand, is the stigma belonging to each. This is formed so as to receive and retain the pollen, being either downy or concave, often irritable, and especially furnished with a peculiar viscid moisture of its own, which cauls the pollen, when of a dry nature, to explode, and when otherwise, to give out its essential substance, so as to be communicated through the medium of the said peculiar moisture, to the rudiments of the seeds, which by that means alone are enabled to bring to perfection the latent embryo of the future plant within them, or, in other words, to become prolific. It has been ascertained that seeds, however apparently perfect in all their other parts, have no embryo unless the pollen has acted upon them as above-mentioned. (See Erbeto and Corculum.) That the pollen is not of an excrementitious nature, and has functions to perform after it has left the anther, is evident from its elaborated structure, and highly elastic, and apparently offensive, properties, which are subsequently disengaged. That its functions, whatever they may be, are not performed by any clandestine communication with the infant seeds, through the other parts of the flower, is demonstrated by the great numbers of flowers which have the stamens in one individual, and the pistils in another, of the same species, growing on different stalks or even distinct roots. That the stigma is no less important an agent than the pollen, appears from its vitality being retained till it has received that stimulus, and no longer, while the parts immediately connected with the stigma, defined to contain, protect, or hereafter to transport, the growing seeds or fruit, remain in full vigour till their destination is accomplished. Thus the stamens of many unbelliferous plants, and various others, after their stigmas are entirely withered, become lengthened, hardened, or recurved, so as to form hooks by which the ripe seeds cling to the coats of animals, and are by that means widely dispersed. Other stamens become feathery crowns or wigs, through which support the seeds are wafted away by the wind, as in most compound flowers. In every case the stigma, however elaborate an organ originally, will be found to have long since disappeared, its "fountains of life" having been dried up as soon as the ends of its creation were accomplished. That the female organs of a flower are, during their growth, before fecundation, independent of the male ones, or stamens, is proved by removing the latter, and impregnating their appropriate pistils with pollen from another blossom of the same species, which will then as effectually perfect their seeds as if they had received pollen from the anthers which naturally belong to them. This last experiment is most satisfactorily performed on flowers that last but one day, as the various species of Gladiolus or Horned-pappy.

Innumerable collateral circumstances confirm the doctrine of vegetable fecundation here advanced. If the pollen be caused to explode prematurely by adventitious moisture, before it reaches its final definition at the stigma, its purpose is defeated, and the appropriate pistils prove barren. This happens to corn and fruit-trees occasionally, from superabundant and uninterrupted rain. Cold also is hurtful, as benumbing the vital energy of the stigma and its concomitant parts. Executive, irregular, or unhealthy nourishment sometimes changes the nature of the stamens and pistils, so as effectually to transform them into other parts of a flower, chiefly petals, thereby entirely defeating their natural purpose, and producing those beautiful monsters called double flowers, which generally return to a natural state, if referred to their natural forms and situations. Accidental or artificial crows fecundation, by application of the pollen of one flower to the stigma of another nearly akin, thereby producing a male offspring, more or less reforming both its parents, but, like animal males, only transiently, imperfectly or not at all, prolific, is perhaps the most conclusive proof of the truth of this doctrine. Linnaeus performed such an experiment on the Tragopogon pratensis, whose flowers are yellow, by sprinkling its stigmas with pollen taken from Tragopogon porrifolius, whose flowers are dark purple. The offspring bore purple flowers, yellow at their base, than which nothing could be more conclusive; and the many varieties, or seemingly new species, of Cape Geraniums, which come up fantastically from seed ripened in our gardens, and sooner or later decline and disappear, afford no less evident confirmation of the sexes and fecundation of vegetables. S.

FECUNDITY, or Fecundity, Fertility, or that quality of a thing which denominates it fruitful.

The fecundity of divers plants is very extraordinary. M. D'Urville has an expert discourse on this subject, in the Memoirs of the Academy of Science; wherein he shows, that, at a moderate computation, an elm, one year with another, yields 329,070 grains or seeds, each of which, if properly lodged, would grow up into a tree; now an elm ordinarily lives 100 years, consequently, in the course of its life, it produces near 33,000,000 seeds, all which arise from one single seed.

He shews farther, that the same elm, by frequently cutting off its head, &c. might be brought to produce 15,840,000,000 seeds, and, consequently, that there are so many actually contained in it.

Fecundity of Fish. See Fish.

FECUNSUM, in Geography, a town of Japan, on the N. coast of Niphon; 28 miles N. of Nato.

FECURI, a town of Japan, in the island of Niphon, on the mouth of the Jado; 65 miles S. of Jado.

FECYUS MONX, in Ancient Geography, a mountain of Gallia Narbonensis, situated on the bank of a lake, near the Rhone, at the mouth of the Rhone, in the country of the Volci Arretium.

FEDALA, in Geography, a sea-port town of Africa, in Morocco, upon a bay of the Atlantic, forming the road belonging to this town, scarcely sufficient to shelter a few small vessels; 8 leagues S. of Monfouria. The above-mentioned bay is partly formed by a little point of land which projects into the sea, and which has been improperly denominated an island. In the year 1773 the reigning emperor, having permitted a great quantity of corn to be brought out of the matadores contiguous to this road, determined to avail himself of the opportunity thus offered for building a city, by obliging the merchants, who wished to have any part of the corn, to build some houses; and thus the town of Fedrala was begun in a very advantageous situation; but no sooner was the corn dispelled of than the town was abandoned;
doned; so that it was ruined before it was finished. The road of Fedala being defended by the coast, which, on the southern side, perceptibly extends to the west, ships may safely anchor here in winter; but, in summer, when the winds blow strongly from the N.N.W., the swell of the sea is very incommunious.

FEDER SEA, a lake of Germany, in the circle of Schwabia, about 12 miles in circumference; communicaly with the Danube by a river called Krautzach; the lake is a little to the east of Buchan.

FEDERATION, or CONFEDERATION, applies principally to certain coalition among powers, generally adjointly situated, and nearly equal in power, for the purpose of maintaining their independence, or for the conquest of some obnoxious people, with whom none of the parties could cope unless aided by the forces of his neighbours. This excellent policy has been on many occasions referred to as the means of self-defence, and, when duly maintained, has rarely failed to accomplish its intent; but, unhappily, we experience in this branch of politics all those evils inseparably attendant upon every combination of persons whose views and interests are not strictly in union; jealousy, ambition, and retrenchment for supposèd flights, rarely fail to baulk that harmony, on which alone the safety of all must depend. Of this, we have a lamentable instance in the late dismemberment of the German empire, of which the several members allowed themselves to be lured by hopes and expectations, such as must ultimately prove illusive; in the mean time they enable him, who should have been considered their common enemy, to destroy the very foundation of their safety, both general and individual, and to extend that power, which had already proved itself too extensive, to admit that Europe should repose in peace, or even prefer its independence.

In like manner we see that immense federation, formed in the heart of Hindoostan by the Mahrattas, proceeding with haftly frides towards its dissolution. There the several princes allowed themselves to be actuated by ambition; each wanted to become the head of a formidable empire; each viewed his neighbour's dominions with a longeng eye, and viewed his every act with suspicion and doubt. Hence it was no difficult task to fet the whole at variance, and to fow discord so abundantly among them, as to raise an impenceable barrier against reconciliation, and future co-operation.

Though not so evidently marked, a certain characteristic of this description may be traced in the conduct of these Indian tribes inhabiting the interior of North America. Formerly, to infult one, was to challenge the whole; but since they have become familiarized to the use of spirituous liquors, and been taught to look forward to their own separate interests, each tribe has been, to a certain degree, estranged from the federation, and all have consequently been, more or less, benefit of both property and power. In this case, however, we are induced to throw a veil over the privations, and the sufferings of a people who have contributed to little, if at all, to the welfare of the world at large; viewing them as ferocious, fanquymary, and treacherous, we may be permitted rather to exult in, than to condemn these encroachments which carry with them civilization and improvement; we therefore feel no disposition to become their partizans.

With respect to that federation or league which has been so often attempted, and so invariably baffled, for the narrowing our maritime influence, little need be said. So long as our ministers remain faithful to their trust, we may confide to the British navy the charge of supporting that exalted character for which it is not indebted to empty panegyric, but to its own substanital merits.

The British empire, while its three, component parts, viz. England (including Wales), Scotland, and Ireland, though governed by one king, had their respective parliaments, and consequently separate establishments and different laws; could be considered only as a federation. A very curious review of past events in those several portions of the united kingdom must satisfy every reflecting mind, that human wisdom could not have devised a more prudent, or a more needful measure, than the abolition of those distinct forms of legislation, upon which our enemies ever depended for support. It is true the minds of all are not as yet reconciled to the combination, but we may safely venture to predict, that puerility will do justice to the sagacity and integrity of that minister who bound our whole population to each other, by mutual advantage; a much stronger tie than could possibly be effected by federation.

FEDIA, in Botany, a name which originated with Adanson, and seems to be derived from Fedus, an ancient word for Heda, a kid. This derivation might at least be probable, if the Fedia of Adanson, like that of subsequent authors, included the Lamb's Lettuce, but it confits of Valeriana fabrica only, to the name of which is not in that sense appropriate, except by a very lax concatenation of ideas. Still less surely can it be deduced from feda, fhiby, fud, or fud, or mean.--Adanson Fam. des Pl. v. 2. 152. Grrn. t. 86. Vahl. Enum. v. 2. 18. Michaux Boreali-Am. v. 1. 18. (Valeria; Linn. Gen. 22. Schreb. 29. Willd. Sp. Pl. v. 1. 175. Sm. Fl. Brit. 37. Jaff. 195. Valerianella; Tourn. t. 52. Rivin. Monogr. t. 4. Locuella; ibid. t. 6. Polypremum; Adaut. loc. cit.) Clave and order Trinia bar Mungo, Nat. Ord. Agregiata, Linn. D. p. 1, loc. Ixx.

Gen. Chi. Col. Perianthis superior, very small, with three or four teeth, at length variously dilated, permanent, Car. of one petal, funnel-shaped; tube gibbous; border five-cleft, regular or irregular, bluntish. Sinus. Filaments three, sometimes four, five, or six, inserted into the corolla, oval-shaped, erect, nearly as long as the border; anthers roundish. P. Germin inferior, of three cells; style thread-shaped, the length of the stamina; stigma notched. Petals. Capilis conicous or membranous, not buryling, crowded with the calyx, of two abortive cells and one fertile. Seed solitary, ovate, smooth.

Eff. Chi. Calyx superior, with three or four teeth. Corolla of one petal, five-cleft. Capilis crowned, without valves, with one fertile cell. Seed solitary.

Perhaps this genus may properly be separated from Valeriana, but it is a question of some difficulty, their natural affinity being very great, and the structure of the parts of fructification in both extremely various. Fedia contains of 12 species in Vahl's Enumeratio Plantarum, that author rating to the rank of species, several heretofore esteemed varieties of Valeria Locuella. Linn. Sp. Pl. 47. Engl. Bot. t. 811. Among these are F. dentata, Sm. Fl. Brit. 375. Engl. Bot. t. 1370.

F. cornucop(a) (Valeriana cornucopia : Linn. Sp. Pl. 44. Sm. Fl. Grec. Sin. t. 32.) is one of the handomell, but it is one that molt betrays a direct relationship to L. amara, and perhaps ought to combine the two genera. If any Valeriana that had featherly crown to the fruit, of which no traces are found in the flower, and which makes it striking a character in molt of the species, the distinction would be obvious and certain, and when they are all properly examined, in flowers and in fruits, it may be found to hold good. If not, we presume Fedus can scarcely be supported.

FEDOA,
FEEOA, in Ornithology, the great Godwit, a species of Scopelos, which fee.

FEEOA is also a name given by Willughby and Ray to the Stone-Curlew or thick-kneed bulbul, the Charadrius Oedicnemus.

FEE, FEUD, FEUDUM, FEUDAM, or FEIS, an estate, land, tenement, lordship, or the like, held of a superior lord, on condition of fealty, homage, or other acknowledgment.

The word is derived by some authors from feu deus, as arising from a treaty or alliance made with the lord; but the opinion of Sedleian seems the best authorized, who deduces it from the Saxon, feath, signification, the fee being a kind of prebend to live upon; and accordingly we find, that in ancient times it was used for the wages and appointments of officers. It is observed by Pontopiddan, in his History of Norway, that in the northern languages adhib signifies property, and therefore feu deus, or feudum, will denote stipendiary property.

The term fee is properly applied to lands and tenements, which we hold in perpetual right, on condition of an acknowledgment of superiority in a higher lord. See Tenure.

The writers on this subject divide all land and tenements wherein a man has a perpetual estate to him and his heirs into allodium and feudum.

Allodium is defined to be a man's own land, which he possesseth merely in his own right, without acknowledgment of any service or payment of any rent to another; and this is property in the highest degree.

Feudum, or fee, is that which we hold by the bene of ancient and for which we do service or pay rent, or both, to the chief lord, in which superior the ultimate property of the land resides. And therefore Sir Henry Spelman defines a feu or fee to be the right which the vassal or tenant hath in lands, to sfe the same, and take the profits to him and his heirs, rendering to the lord his due services; the mere alloidal propriety of the soil always remaining in the lord. This alloidal property no subject in England has; it being a received, and now undeniable, principle in the law, that all the lands in England are holden mediately or immediately of the king.

Originally a feu was only an estate for life; and thence to whom it was granted were called vassali, who by such means were brought to a fierier discipline and obedience to the princes, and were bound to serve them in wars.

The origin of fees or fees is one of the darkest and most intricate points in modern history. Some attribute the invention to the Lombards. Sir Thomas Craig inclines to this opinion, and says, that the Lombards, after they were subdued by Charlemagne, not only retained their ancient customs, but at the return of that emperor into France transmuted them with him into the remotest parts of that kingdom. In reality, the constitution of fees had its original from the military policy of the Northern or Celtic nations, the Goths, Huns, Franks, Vandals, and Lombards, who spread themselves over Europe at the declension of the Roman empire. This is rendered probable by the demand which the Cimbri and Teutones, nations of the fame original, are recorded to have made on the Romans on their first irruption into Italy, about a century before the Christian era. They demanded of the Romans, "Ut martius populus aliquid libi terre dare, qualis ripendum: ceterum, ut velit, manibus atque armis suis uteretur;" i.e., they desired fees to be allowed them, which they were to hold by military and other personal services.

L. Plinias, lib. iii. cap. 5.) Having brought this constitution from their own countries, they continued it in their respective colonies as the most likely means to secure their new acquisitions; and for this purpose the victorious general allotted large districts of land to the superior officers of the army; and these again distributed smaller parcels to the inferior officers and more deserving soldiers. However, the feudal policy was only brought by degrees into that state, which we find established in the empire under Conrade the Second, who was the first emperor that rendered fees hereditary, and in France under Hugh Capet. Sir Thomas Craig has distinguished four states of the feudal law; its infancy, comprehending the period between the first overflowing of the northern nations and the year 650; its childhood, the time in which fees, which were before annual, or at most for life, were extended to the sons of the vassal, and no farther, viz. from the year 650 to the year 800; when Charlemagne was crowned emperor; its adolescence, from the times of Charlemagne to the reign of Conrade II. or the Salic, who began his reign in the year 1024; and not only confirmed the inheritance of fees to the sons and grandsons of the vassals, but permitted one brother to succeed another in his paternal estate; but even after the alteration made by Conrade, it was not uncommon in Germany to grant fees only for life; a charter of this kind occurs as late as the year 1376; and its maturity from this period forward, when fees were permitted to descend to collaterals as far as the seventh degree. Others find some appearance of the duties of a vassal to his lord, in the ancient relations between the patron and his valet; and others look for its rise in the Roman Beneficce.

The emperors, it seems, distributed lands among the ancient legions on condition of their holding themselves ready at all times to take up arms in defence of the frontiers of the empire, which affords us a good image enough of fees, though in all probability their first origin should be traced higher; but in processes of time their nature was changed, and duties were annexed to them which originally were not.

Du-Moulin makes no doubt, but that these distributions of land called benefices, were the first matter of fees; for which reason he uses the terms benefice and feud promiscuously, as if they were the same thing; and yet there was a good deal of difference between them, as there was neither fealty nor homage, nor the other feudal rights annexed to the benefice; and that the benefice was not hereditary.

Probably benefices, (see Benefice,) began then to be called feudums, when they became hereditary; and when those of whom the benefices were held began to demand faith or fealty from them. This fealty seems to constitute the feu; the word feu itself signifying, in the ancient Norman language, faith.

There is no fixing the precise era when these changes commenced; for fees, such as they now are, were not established at once; but in different countries they took place at different times, and in different manners.

The great lords, after the declension of the Roman empire, having in several parts usurped the property of their benefices, laid likewise hold of the jurisdiction, and made their vassals their vassalz; so that each became a lord of petty sovereign in his own territory.

Mezeray observes, that the donation of fees to the noble of France commenced under the reign of Charles Martel.

Hugh Capet, when he came to the crown, was himself so little established that he durst not oppose those usurpations, and was forced to suffer what he could not redress.
The origin of fees in England, Camden carries as far back as the time of Alexander Severus. That prince having built a wall in the north of England to prevent the incursions of the Picts, he some time after began to neglect the defence thereof, and gave, as Lampridius, in Vita Alex. Severi, affirms us, the lands conquered from the enemy to those of his captains and soldiers, whom that author calls "limitarii duxce, & militis"; i.e. captains and soldiers of the frontiers; but it was on this condition, that their heirs should continue in the service, and that the lands should never descend to private persons; i.e. to such as did not bear arms. That prince's reason was, that people, who, in serving, defended their own, would serve with a great deal more zeal than any others. Such, according to Camden, was the rite of fees in our nation. Britan. p. 651.

However, the feudal policy originally derived from the Northern nations, and gradually established on the continent of Europe, was not universally received in England, though some traces of it may be discerned in the times of the Saxons, who were firmly settled in this island as early as the year 600, and incorporated with the national constitution, till the reign of William the Norman; and this was done not by the mere arbitrary will and power of the conqueror, but by the universal consent of the common council of the kingdom, on the same principle of self-security which had before induced the other nations of Europe to adopt it. The era of formally introducing the feudal tenures by law was probably the latter end of the year 1086, when the king was attended by all his nobility at Sarum, and all the principal land-holders submitted their lands to the yoke of military tenure, became the king's vassals, and did homage and fealty to his person. This ingraining of the feudal tenures and other customs of Normandy upon the ancient Saxon laws of Edward the Confessor, produced a different political system in this country, and changed both power and property in many respects; for those hereditary eftates of the Saxon nobility and gentry which were alloidal, and not subject to any feudal service, were converted into fees, and other lands which were of a feudal nature, and held by military service, having been granted only at will, or for a certain number of years, or at most for life or lives, and the grants of which were called benefices, were made hereditary fees. The feudal rights claimed in consequence of this establishment by the king over his tenants, and by them over their's, were considerably mitigated by the charter of Henry J. But, notwithstanding this charter, former grievances were revived and aggravated by Henry and his successors, till in the reign of king John, they became so intolerable, that they occasioned his barons, or principal feudatories, to rise up in arms against him; which at length produced the famous great charter. (see MAGNA CHARTA) at Runnymead, which, with some alterations, was confirmed by his son Henry III. Upon the whole it appears from the history of feudal tenures, and the alterations that have taken place with regard to them, in the successive reigns of Henry I., John, Henry III., and Charles, that the liberties of Englishmen are not (as some arbitrary writers would represent them) mere infringements of the king's prerogative, extorted from our princes, by taking advantage of their weakenss; but a restoration of that ancient constitution, of which our ancestors had been deprived by the art and science of the Norman lawyers, rather than deprived by the force of the Norman arms. See Conquest.

Although the barbarous nations, which framed the feudal system, and from which it seems to have originated, settled in their new territories at different times, came from different countries, spoke various languages, and were under the command of separate leaders, the feudal policy and laws were established, with little variation, in every kingdom of Europe. Hence some have concluded, that all these nations, notwithstanding so many apparent circumstances of distinction, were originally the same people. It may, however, with greater probability, be ascribed to the similar state of society and of manners to which they were accustomed in their native countries, and to the similar situation in which they found themselves on taking possession of their new domains. As the conquerors of Europe had their acquisitions to maintain, not only against such of the ancient inhabitants as they had spared, but against the more formidable inroads of new invaders, self-defence was their chief care, and seems to have been the sole object of their first institutions and policy. Instead of those loose associations, which, without diminishing their personal independence, had been sufficient for their security, while they remained in their original countries, they faw the necessity of confederating more closely together, and of relinquishing some of their private rights in order to obtain public security. Every freeman, therefore, upon receiving a portion of the lands which were divided, bound himself to appear in arms against the enemies of the community. This military service was the condition upon which he received and held his lands; and as they were exempted from every other burden, that tenure, among a warlike people, was deemed both easy and honourable. The king, or general, who led them to conquer, had the largest portion allotted to him; and he parcelled it out among those who entered into an obligation to bear arms in his defence. His chief officers imitated his example, in distributing portions of lands among their dependants, upon the same condition. Thus, a feudal kingdom resembled a military establishment rather than a civil institution. The names of a squire and a freeman were synonymous. Every proprietor of land, gilt with a sword, was ready to march at the summons of his superior, and to take the field against the common enemy. The feudal government, however, though admirably calculated for defence against the assaults of any foreign power, was defective in its provisions for the interior order of society. The bond of political union was extremely feeble; and the sources of anarchy were innumerable. The powerful vassals of the crown soon extorted a confirmation for life of those grants of land which, being at first purely gratuitous, had been bestowed only during pleasure. They then succeeded in having them converted into hereditary possessions; and at length in rendering them unalienable. The crown vassals, after having secured the possession of their lands and dignities, were led by the feudal innovations to new, and still more dangerous encroachments on the prerogatives of the sovereign. They obtained the power of supreme jurisdiction, both civil and criminal, within their own territories; the right of calling money; together with the privilege of carrying on war against their private enemies in their own name, and by their own authority. Subordination was almost lost, and persons of superior rank aspired to independence. Hence a kingdom, considerable in name and extent, was broken into as many separate principalities as it contained powerful barons. A thousand causes of jealousy and discord sprang up among them, and gave rise to as many wars. Every country in Europe, walked or kept in continual alarm during these endless contests, was filled with castles and places of strength, erected for the security of the inhabitants, not against foreign force, but against internal hostilities. Indeed an almost universal anarchy prevailed. The guilty escaped
escaped punishment, and the innocent could not find protection. Such was the state of Europe with respect to the interior administration of government from the 7th to the 11th century. This system likewise prevented nations from acting with vigour in their external operations. Besides, the feudal anarchy had a fatal influence on the character and improvement of the human mind. Without the protection of regular government, and the certainty of personal security, it cannot be expected that men will make any progress in the arts and sciences, or aim at attaining refinement in taste or manners. In less than a century after the barbarous nations formed in their new conquests, almost all the effects of the knowledge and civility which the Romans had spread through Europe disappeared. The human mind, neglected, uncultivated, and depressed, sunk into the most profound ignorance. The inhabitants of Europe during this period were not only strangers to the arts which embellish a polished age, but deftillute of the virtues which abound among people who continue in a simple state.

Having curiously mentioned several of the disadvantages and pernicious effects of the feudal system, and they were sufficiently great, we ought not to omit some few circumstances that may be alleged in its favour. This system, in its very nature, stood opposed to the arbitrary power of the crown, and provided for the political liberty of all those who possessed any portion of landed property. This system also nourished a manly and vigorous spirit, which, however hurtful in some of its immediate effects, has been eminently fertile in the progress of society. We must add, that the feudal system caused even the clergy, too frequently the tools of absolute monarchs, to be the great aboler and promoters of freedom. This fact is acknowledged by various instances that occur in our own history. The bishops, in consequence of the feudal tenures, found it their interest to unite with the barons and great landholders in resisting the encroachments of our princes; and they did it, in several cases, with distinguished ability and success. The bishops were particularly instrumental in obtaining the famous Magna Carta (which see). The most important and valuable articles of that instrument were probably owing to Stephen Langton, archbishop of Canterbury. With respect to the clergy in general, notwithstanding the ignorance and bad conduct of too many of them, and the anarchy of their tenets, they were very useful in moderating and restraining the disorderly spirit of the feudal times. They often interfered in the cause of humanity and justice. They were the only depositaries of the knowledge and literature that remained in the world; and the monastic institutions, in particular, were the chief protectors of agriculture, and of both the necessary and elegant arts.

But to return from this digression. The disorders in the feudal system, together with the corruption of taste and manners consequent upon these, which had gone on increasing during a long course of years, seem to have attained their utmost point of excess towards the close of the 11th century. From that era we may date the return of government and manners in a contrary direction; and it is not difficult to trace a succession of causes and events which contributed to abolish confusion and barbarism, and to introduce order, regularity, and refinement. Among the principal of these we reckon the Crusades, the formation of cities into communities, corporations, or bodies politic, and granting them the privilege of municipal jurisdiction; for when the inhabitants of cities obtained personal freedom and municipal jurisdiction, they soon acquired civil liberty and political power. The feudal system, however, did not decline with equal gradations in all parts of Europe. It did not decline so fast in Scotland as in England; nor, while it was a separate kingdom, did their commons ever acquire the same power. This was owing to the low state of commerce, industry, and arts, among the Scots.

We may observe that there are considerable remains of the feudal system at this day in Europe. In Germany it subsists, in many respects, as much as ever. The husbandmen of Poland are confined to the glebe; as they are also in Bohemia, in Swabia, and in other parts of Germany; and even in France, in some provinces remote from the capital: were, said Voltaire in his time, some remains of this fable. The most visible traces of this system in England are in the forms of law: almost all the remains of the feudal system in England, except these forms, having been abolished in the reign of Charles II. by act of parliament. The feudal law carried with it a system of private rights, which swallowed up all others wherever it came, and involved likewise, in giving effect to these rights, a system of "forms," which remain even where the original rights are no more. It is particularly worthy of notice, with respect to the feudal system, that a form of government so uniform in its principles should have branched out, as it were, under different circumstances, into other forms so totally different from one another as are the constitutions of the several European states; which were almost all, originally, equally feudal, and, therefore, necessarily similar to one another. But what is most of all remarkable with respect to the feudal system is, that a form of government so calculated to secure the most valuable ends of society, a constitution equally inconfident with security and liberty, and so unfriendly to commerce and science, should, in several instances, have terminated, by the natural course of things, in governments under which men enjoy the greatest security, together with all desirable liberty; and where the utmost scope is given to the genius of man in the extension of arts, manufactures, commerce, and science. Lord Lytton's Hist. of King Henry II. vol. i. p. 59, &c. vol. iii. p. 97, &c. Blackstone's Comm. vol. ii. cap. 4. Robertson's Ch. V. vol. i.

All our lands in England (the crown-land, which is in the king's own hand, the right of his crown, excepted) are of the nature of feud or fee. For though many have land by descent from their ancestors, and others have bought lands, yet land cannot come to any, either by descent or purchase, but with the burden that was laid on him who had the novel fee, or who first received it as a benefice from his lord to him, and such as should descend from him, or to him it should be otherwise conveyed and transferred; so that no man has directum dominium; i.e., the very property or dominium in any land, but the prince in right of his crown.

(Camd. Britan. p. 93.) Though he who has fee has jus perpessimum, and utile dominium, yet he owes a duty for it; so that it is not strictly his own. Indeed, as much is imported by the terms in which we express our highest right in lands, &c. the most a man can say is, "I am feised of this land in my domain or demesne as of fee."

The grand and fundamental maxim of all feudal tenure is this; that all lands were originally granted out by the sovereign, and are therefore held, either mediately or immediately, of the crown. The grantor was called the proprietor, or lord, who retained the dominion or ultimate property of the feud or fee; and the grantee, who had only the use and possession, according to the terms of the grant, was styled the feodatory, or vassal; another name for the tenant or holder of the land. The manner of the grant was by words of gratuity and pure donation, "dedit et concedit," which are still the operative words in our modern deeds of feoffment. This was perfected by the ceremony of corporal
FEE.

eral investiture, or open and notorious delivery of possession in the presence of the other vassals, which perpetuated among them the era of the new acquisition, at a time when the art of writing was little known; and therefore the evidence of property was repose in the memory of the neighbourhood; who, in case of a disputed title, were afterwards called upon to decide the difference, not only according to external proofs adduced by the litigant parties, but also by the internal testimony of their own private knowledge. The vassal or tenant took an oath of fealty (see Fealty), and upon investiture did homage to his lord; (see Homage.) This was followed by the service which he engaged to perform to his superior or lord, in recompence for the land which he held. In pure, proper, and original feuds, this service was two-fold; to follow, or do suit to the lord in his courts in time of peace; and in his armies or warlike return, when necessity called him to the field. At the first introduction of feuds, which were gratuitous, they were precarious, and held at the will of the lord; who was then the sole judge whether his vassal performed his services faithfully. Then they became certain, for one or more years. Among the ancient Germans they continued only from year to year; as an annual distribution of lands was made by their leaders in their general councils or assemblies. (See Tacit. de Ger. Cym. c. 4.)

In process of time, feuds began to be granted for the life of the feudatory. But they were not yet hereditary, though occasionally granted by the favour of the lord to the children of the former possessor, on payment of a fine or acknowledgment to the lord, which was called a relief. Afterwards feuds were by degrees universally extended beyond the life of the first vassal to his sons, or to such of them as the lord should name; but as the sons died off, their shares reverted to the lord, without descendent to their children, or to their surviving brothers. But when a feud was given to a man and his heirs, in general terms, a more extended rule of succession took place; and when the feudatory died, his male descendants in infinitum were admitted to the feccion, and in defect of them, such of his male collateral kindred as were of the blood or lineage of the first feudatory, and no others. The decent being confined to males, originally extended to all the males alike; but this being found insufficient, and hencefeuds (or titles of nobility) being introduced, which could only be inherited by the eldest son; in imitation of these, military feuds (or those now described) began in most countries to descend according to the same rule of primogeniture, to the eldest son in exclusion of all the rest. The feudatory could not alienate or dispofe of his feud, nor could he exchange, nor mortgage, nor devise it by will, without the consent of the lord. When feuds ceased to be military, they began to be bought and sold, and deviations were made from the old fundamental rules of tenure and feccion. See Tenure.

It should be observed, that our English lawyers do very rarely (of late years especially) use the word fee in this its primary original sense, in contradistinction to allodium or absolute property, but generally use it to express the continuance or quantity of an estate; so that a fee in general signifies an estate of inheritance, being the highest and most extensive interest that a man can have in a feud; and in that sense of the term it is applicable to, and may be had in, any kind of hereditaments, either corporeal or incorporeal; with this distinction, that of a corporeal inheritance a man shall be said to be feigned as of fee, and not in his demesne. (Litt. § 1.)


In the Stat. 37 Hen. VIII. cap. 16, fee is also used for lands inherited in the crown; but it is from ignorance of the import of the word; for fee cannot be without fealty, for it is to a superior; but the king owns fealty to no superior but God alone.

Fee is divided in our laws into fee-absoluto, called also fee-simple; and fee-conditional, also called fee-tail. See Feud.

FEE, Frank. See Frank.

Fee-simple, feudum simplex, is that whereof we are feigned to us and our heirs for ever. Or it denominates an absolute inheritance, clear of any condition, limitation, or restriction to particular heirs, but descendentable to the heirs general, whether male or female, lineal or collateral. It is a general rule, that the word heirs is necessary in the grant or donation, in order to make a fee or inheritance; but this rule does not extend to devises by will, nor to fines and recoveries considered as a species of conveyance, nor to creation of nobility by writ, though in creations by patent, the word heirs must be inserted; nor to grants of lands to fole corporations and their successors; nor finally, to the case of the king, in whom a fee-simple will veal, without the words heirs or successors in the grant.

Fee-tail, feudum taillatum, is that whereof we are feigned with limitation to us and the heirs of our body. See Tail.

Fee-tail is of two kinds, general and special.

Fee-tail general, is where lands and tenements are given to a man and the heirs of his body begotten. So that if a man feigned of such land by such gift marry one or more wives, and have no issue by them, and at length marry another, by whom he hath issue, this issue shall inherit the land.

Fee-tail special, is where a man and his wife are seigned of lands to them and the heirs of their bodies; where, in case the wife die without issue, and he marry another by whom he have issue, this issue cannot inherit the land, and therefore it is called special tail.

This fee-tail special has its origin from the Stat. of Westm. 2. 13 Edw. I. cap. 1. Before that statute, all land given to a man and his wife, either general or special, was reputed in the nature of a fee; and therefore firmly held to him, that, any limitation notwithstanding, he might alienate it at pleasure; for redrefs of which inconvenience the statute provides, that if a man gives lands in fee, limiting the heirs to whom it should descend, with a reversion to himself and his heirs for default of such former heirs, the form and meaning of the gift shall be observed.

Estates, in general and special tail, are farther diversified by the distinction of sexes in such estates; for both of them may be in tail male or female; as if lands be given to a man and his heirs male of his body begotten, this is an estate in tail male general; but if to a man and the heirs female of his body on his present wife begotten, this is an estate in tail female general; and in case of an entail male, the heirs female shall never inherit, nor any derived from them; nor conveyance, the heirs male, in case of a gift in tail female. (Litt. § 21.)

As the word heirs is necessary to create a fee, to the word body, or some other words of proclamation, are necessary to make it a fee tail, and to ascertain what heirs in particular the fee is limited; though in wills and testaments greater indulgence is allowed. The incidents to a tenancy in tail, under the statute Westm. 2. are clearly these (Co. Litt. 24.) 1. That a tenant in tail may commit

E e
waif on the estate-tail by felling timber, pulling down houses, or the like, without being impeached or called to account for the same. 2. That the wife of the tenant in tail shall have her dower or thirds of the eate-tail. 3. That the husband of a female tenant in tail may be tenant by the curtesy of the eate-tail. 4. That an eate-tail may be barred or destroyed by a fine, by a common recovery, or by lineal warrant-taking by tenant with affricts to the heirs. By sub- sequent quantum, eate-tail may be aliened, are liable to forfeiture for high treason, and are chargeable with reasonable leafes, and with such debts as are due to the crown on specie- slies, or have been contracted with fellow subjects in a course of commerce.

Fees, Base, or qualified, is a conditional fee that has a qualification subjoined to it, and which must be determined whenever this qualification is at an end; as in the case of a grant to A. and his heirs, tenants of the manor of Dale; whenever the heirs of A. cease to be tenants of that manor, the grant is entirely defeated. Blackstone's Comm. vol. ii. chap. 7. See Entail.

Fees-exceptant, feudum exemptiun. See Statut, and Expectant.

Fees, or fees, fees-feud, fera, or fera-feud, is a tenure of lands by which they are held to a person and his heirs for ever, under a certain annual rent. Fee farm takes place upon the creation of a tenancy, when the lord refers to himself and his heirs either the rent for which it was before let to farm, or at least a fourth part of the rent, and that without homage, fealty, or other services, more than are especially comprized in the feoffment. Yet it would appear by Fitzherbert, that the third part of the value may be appointed for the rent, or the finding of a chaplain to say divine service, &c. And the nature of it is this; that if the rent be behind, and unpaid for the space of two years, then the foowner or his heirs have action to recover the lands as their demesne.

 Fees, rents of the Crown, are such rents as issue to the kings of England from their ancient demesne, many of which were alienated from the crown in the reign of Charles II.

Fees is also used for the compass or circuit of a manor or lordship. Thus Dracot, "in cadem villam & de cadem feudo."

Fees is also used for a perpetual right incorporeal; as to have the keeping of the perions in fee, rent granted in fee, and office held in fee, &c.

Fees, Knight's. See Knight's Fee.

Fees also signifies a reward or ordinary due given a peron for the execution of his office, or the performance of his part in his respective art or science.

Thus, the lawyer, barrister, and physician, are paid to have their fees; i.e. consideratins for the pains taken with the client or patient. If a peron refuse to pay an officer his due fees, the court will grant an attachment against him, to be committed till the fees are paid; and an attorney may bring an action of the caf for his fees against the client that retained him in his cause. With us, some have said that a counsel can maintain no action for his fees, which are given not as locutio vel conditio, but as quiduum honorarium: not as a salary or hire, but as a mere gra- tuity, which a cunning fellow cannot demand without injury to his reputation. This, however, has been held otherwise.

F.N.B. 1 Brownl. 73. 31 H. VI. c. 9.

Fees also denote several perquisites or allowances paid to public officers by persons who have business with them. The fees due to the officers of the Custom-house are expressly mentioned in a schedule or table, which is hung up to view in the said office, and in all other places where the fees are to be paid; and if any officer shall offend, by acting contrary to the regulations therein contained, he shall forfeit his office and place, and be for ever after incapable of any office in the Custom-house.

The small fees of the fabulists of divers of the king's ser- vants is compensated by the perquisites or fees of honour. The fees paid to the several officers by every person upon his being knighted amount to 76d. 1s. 4d. And if it be done within the verge of the court, there is 3s. more to the fix pages of the bed-chamber, which brings it to 81d. Every knight of the most noble order of the garter pays, upon his installation, if Prince of Wales, 6d. 13s. 4d.; if a duke 20s.; if a marquis 16s. 18s. 4d.; if an earl 12s. 13s. 4d. The fees due for the entrance into the house of lords are as follows:

Prince of Wales  -  30 0 0
An Archbisp -  27 0 0
A Duke -  27 0 0
A Marquis -  19 6 8
An Earl -  14 0 0
A Viscount -  11 0 0
A Bishop -  14 0 0
A Baron -  9 0 0

These fees are paid by every peer on his first introduction to the house, both on his original accession to a title, and his advancement to a higher one, and every bishop upon his first consecration, and upon any future promotion.

The homage-fees due on the accession of a peer are,

Prince of Wales -  703 6 8
Ditto, as Earl of Chester -  203 3 4
A Duke -  350 3 4
A Marquis -  272 10 7
An Earl -  223 3 4
A Viscount -  159 7 4
A Baron -  150 5 4

Besides the sum charged in the king's books, every bishop pays, on his consecration or promotion, as homage-fees, 15s. 1s. 4d. and an archbishop double this sum.

FEED, in Rural Economy, the portion or quantity of oats or other sort of grain or provender, which is given to a horse or other animal at one time. The term also implies the fattening of different sorts of live flock, as neat cattle, sheep, &c. 

FEEDER, in Engineering, is a cut or channel, sometimes called a carriage or catch-drain, by which a stream or supply of water is brought into a canal; sometimes the stream of water itself, which is so supplied to a canal, is called a feeder. See Canal.

FEEDERS, in Rural Economy, signify by graziers those neat cattle which are bought in expressly for the purpose of being fed off.

FEEDERS of a Vein, in Mining, are the short crofs veins which appear to branch from it in some instances, and are so called from the vulgar notion that these feed or supply the vein with ore: frings and feedings are sometimes used as terms for these short crofs veins.

FEEDING, in Rural Economy, the act or process of fattening any sort of live flock on a farm.

FEEDING of Cattle, the process of rendering them in a state proper for the butcher. It likewise signifies the foddering of them.

FEEDING House, or Shed, is that sort of farm-building which is constructed for the purpose of fattening neat cattle. It should have a dry warm situation, be capable of
free ventilation, and be well supplied with proper conveniences for the reception of food and water. See Cattle Sheds.

Feeding Grounds, such lands as are set apart for the fattening of different sorts of live stock. They are chiefly those of the rich deep pasture kinds.

Feeding-Piece, a field or portion of grass land which is employed for the purpose of grazing animals. It is advantageous to have such a piece near to the homestead.

Feeding-Down, the practice of ringing down grass lands with different sorts of live stock. In new lands some prefer moving the few first years, from the supposition that grazing is more injurious to them; but the superiority of these different practices has not yet been fully ascertained. See Laying down to Grazing, and Pasture.

Feeding-Grounds, in Mining, is used by some miners to denote certain kinds of soil or rock, which are supposed to feed or to supply ore to veins in their vicinity; it is a certain fact, that some beds of limestone in Derbyshire, called bearing-measurers, have generally ore in the veins which intersect them, when often the same veins contain little or no ore between the measures above or below those bearing measures.

Feeding-Foul, in the Manger. See Foul.

Fejee, in Geography, an island in the Southern Pacific ocean, about three days sail from Tongataboo, in the direction of N. W. by W. It is represented as a high but very fruitful island; abounding with hogs, dogs, and fowls, and all the kinds of fruits and roots that are found in any of the others, and as being much larger than Tongataboo, to the dominion of which it seems to be subject, as the other islands of the Archipelago are; although, on the other hand, Fejee and Tongataboo frequently make war upon each other; and the inhabitants of the latter appear to be much afraid of those of the former, who were really formidable on account of their peculiar dexterity in the use of bows and slings, and also on account of the savage practice prevalent among them of eating the enemies whom they killed in battle. The more northerly part of this numerous group was discovered by Tafman in 1643; and it is the name of the native of the islands and reefs that was explored by the Dutch, and to which the names of the islands are generally attached. They are supposed to be the Arawak people, who were on their way to the islands of the Southern Ocean, where they settled, and from which they are said to have migrated northward, as the islands of the South Sea are said to have been inhabited by the Polynesians, and the latter are said to have come from the north.

F-Toil, in the Manger. See Toil.

Feeler, Antenna, in Natural History, are the horns, as they are usually called, upon the heads of insects. See Entomology.

Feeling, in Physiology, the power in any organ of receiving the impressions of external objects, and of conveying these to the brain, so as to cause sensation; or of exhibiting the same phenomena from alterations in the state of the organ itself. In this explanation the word is equivalent to sensibility, and denotes the capacity of being acted upon, and of acting again on the sentient principle: thus we say that any part has much or little feeling, &c. In a more confined sense, this word signifies the sense of touch, which is the particular mode of sensibility belonging to the surface of the body. The subject is explained under the articles Brain, Sensibility, and Skin.

Feesura, in Geography, a town of Africa, in the kingdom of Kaarta; 28 miles W. of Kemmo.

Feet, a town of Norway, in the government of Agderhus; 36 miles N. E. of Frederikshald.

Feet-Preparation, in Medicine, a species of preternatural or crofts birth, in which, on the bursting of the membranes, during labour, one or both of the feet of the child come down into the vagina, instead of the head. In this case, the pains usually cease, and do not recur again, until nearly the whole of the liquor amnius is drained away, which frequently is not completed in less than three, four, or more hours. This suspension of the pains is apt to excite uneasiness in the patient, or her attendants, and the accoucheur is often pressed to give assistance, which he must however avoid doing, until, by the recurrence of the pains, he is satisfied that the uterus is contracted, so as to come again into contact with the body of the child. He may then gradually, and moderately assist, during the pains, in drawing down the legs of the child; still keeping in mind the rules to be observed in all cases, where delivery is to be performed by art, not to empty the uterus too hastily.

When the breech is delivered, the accoucheur will attend to the position of the child, and if the belly be pressed towards the pubes of the mother, turn it towards the lacerum, and then complete the delivery in the manner directed under the article Labour, preternatural.

Feg, in Agriculture, a term used provincially to signify the tough dead grass which remains in pastures after they have been eaten down by flock.

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Fegal, in Geography, a term used provincially to signify the tough dead grass which remains in pastures after they have been eaten down by flock.
FEGALLE, or Fagaló, Cape, in Geography, a cape on the coast of Algiers, called by the Moors "Ras Azin-toure," N. lat. 35° 40'. E. long. 0° 54'.

FEGARI, a town of Japan, in the island of Nippon; 70 miles S. E. of Meaco.

FEGESAK, or Vegesak, a town of Germany, in the duchy of Bremen; eight miles N. N. W. of Bremen.

FEGLINA, a town of Naples, in Calabria Citera; seven miles S. E. of Cofenza.

FEHRBAD. See Farbad.

FEHERBACH, a town of Germany, in the lordship of Furthberg; 16 miles E. of Eulenburg.

FEHRNELLIN, a town of Germany, in the middle Mark of Brandenburg, on the Rhine; 28 miles N. W. of Berlin. N. lat. 52° 53'; E. long. 12° 25'.

FEI, a town of China, of the third rank, in Chang-tong.—Alfo, a river of Perfa, which runs into the Mes, eight miles S. E. of Sue Samul, in Chufilfan.

FEID. See Faid.

FEIDERSDORF, in Geography, a town of Germany, in the principality of Cumbach; eight miles S. W. of Cumbach.

FEIGNÉD ACTION, in Law. See Fain Actio.

FEIGNÈD ISSUE. See Fained Issuat.

FEILTSCH, in Geography, a town of Germany, in the principality of Cumbach; three miles N. E. of Hof.

FEINT, in Feinting, a feafe attack, or a f讳 of making a froke or thrift, in one part, with defign to induce the adverfary to form a parade for guarding that part, and leaving some other part unguarded where the thrift is really intended.

Feints are either finge or double, high or low, without or within, &c. in prime, in tierce, in quart, in demi, and in the whole circle; of one, two, or three meafures.

The fimple feint is a mere motion of the wrif, without firring the foot, &c.

Feint, in Rhetoric, a figure whereby the fpeaker touches on fomething, in making a f讳 of paving it over in silence.

The Latinfe call this preternitio.

Feint-Attack, in the Military Art, is a manœuvre referred to on a variety of occasions, but efpecially when the defence of a town, &c. are to be carried by force. However easy it may appear to diftract the attention of the defenders, or to attract it to a wrong direcHon, fuch is not actually the cafe in general. This rule of warfare has been fo vefely pronounced that none but the moft un guarded commanders are to be deceived by the mere difplay of an armed force in a quarter where the works are not abolutely insignificant, or reduced to a defecled flate.

A feint-attack, it is to bê recollected, must assume fuch a form as should give a moft imposing air; it fhould carry with it fuch evident power, as at the leaft fhould ferve it from deftruétion in the event of the garrifon feeing through the device, and either allowing the affiftants to advance, under the idea of complete fucces, into a fhare, or making a fally, fuch as fhould leave no room for boafting of the effect of the enterprize; in either cafe, ruin will generally follow.

The immense variety of cafes, and of situations, that could be added, would, if individually treated in this work, trefpafs far beyond the ordinary importance of the article among our readers in general; the fubjeft might swell an ample octava. We muft therefore confine ourselves to obferving, that feint-attacks generally fucceed beet in the dark, and ought in every infance, where cavalry is at hand, to be supported by fuch a force of that defcription as fhould fuffice to cover a retreat. If it is known that the place is well-manned, the feint-attack fhould not be confined to one part; feveral fhwes of forming parties fhould be made, under the previous caution of having a body of cavalry between two fuch indications, ready to aid either that may be purfued. When a garrifon is weak, there may be much benefit by changing the feint-attack into a feint-retrait, thereby inducing the defenders to quit their works, and to advance within the reach of fame latent force. Where it is accurately a!certained that a feint, and not a real attack is made, the belt pol icy is for the defenders either to remain perfectly quiet behind their walls, if the fition be secure; or to keep up a thin fire, from rifle men, fo as to make each shot take effect, yet at the fame time retaining the defpafsible force under cover, as much as poffible concealed, fo as to fall suddenly on the affiftants, who may be expected to push forward, under the idea of meeting but little resistance.

Where equal forces are oppofed, the feint-attack is ex tremely hazardous; and, even under certain advantages, in point of numbers, cannot be too cautiously adopted. If the main affault fhould not be fuccessful, the word of con fquences may ordinaril}' be expected; as not only will much loss be fustained in that quarter, but the means of refucing the fainter party be completely superfed by that necesity which felf-prefervation ever impoies. We do not mean to deny that the moft brilliant refults may attend the manoeuvre when favourably circumftanced, but to caution thofe who, from adventurophy reading of the few fuccefsful fubjefts, entertain fuch fanguine expectations, as to caufe their banifhing all ideas of deferent, from giving too great scope to expe cttation; and, at all events, from indulging in the fpecula tion without the felf intelligence, the bent means of approach, and the certainty of being able to efct their retreat. It is to be carried in mind, that in all probability, information of the intened affaults will reach the befieged, fo as to give ample scope for preparation accordingly; or, to fay the leaft, that they may be competent to form a correct opinion, regarding the intentions of their opponents; in either cafe much may be apprehended.

FEINTE, an old French musical term, to expreff the alteration of any note or interval, by a fharf or a flat. It is properly the general term for dioces and accidental flats.

Roulaffe fays, "this word is no longer in use; but to other is fubstituted in its room. The fear of using fuperfi tious words daily enervates and impoverishes our language: its greatest execrables are the purfils. The short, or chromatic keys on a harpichord, now denominated sharps and flats, used to be called feinte. The keys which are white used to be black, because our courage and vulgar artifls never thought of making the cavier black to fet off the ladies hands. Short eighth in organs and old infrumens are likewise called feinte coup, or cut keys."

FEIRA, in Geography, a town of Portugal, in the province of Beira; 10 miles S. of Oporto.

FEISOUN, a town of Affric Turkey, in the government of Diarbekir; 40 miles N. of Diarbekir.

FEISTRITZ, a town of the duchy of Stiria, four miles N. of Muchran.—Allo, a river of the duchy of Stiria, which runs into the Saven, nine miles N. E. of Laybach.—Allo, a town of the duchy of Carinthia; 10 miles N. E. of Saxenburg.

FEI-TCHIN, a town of China, of the third rank, in Chang-tong; 25 miles S. S. W. of Tei-nan.

FEITRINGE, a town of Sweden, in the province of Schonen; six miles E. of Christianstadt.

FEIUM. See Fayoum.
FEKETEBANJA, a town of Hungary; 28 miles N. E. of Zatmar.

FEKETELO, a town of Transylvania; 23 miles S. W. of Colofovar.

FEKETEPATAK, a town of Transylvania; 25 miles S. W. of Colofovar.

FEKETEPATOR, a town of Hungary, 18 miles S. E. of Grof-Wardein.

FEL, Mad. in Biography, a finger in the French opera at Paris, of high renown, and durable favour. She was the daughter of an able organist at Bourdeaux, born 1716, and received at the great opera in 1733. Her sweet, pure, and silver-toned voice delighted the public 20 years, and would have continued in favour twenty years more, if bad health, and a feeble chest, had not obliged her to quit the stage in 1759. Mad. Fel sung equally well in French and Latin, and was one of the French who had not the least spirit for whom the devoted the last years of her life, and who cherished her personal qualities as much as they did her vocal talents. La borde.

FEL, in the Materia Medica of the Ancients, the name of a fruit much used by them in domestic medicines, but very badly described by us. All that we know of the matter is, that there were three fruits brought from the Indies at that time, and called bel, fel, and fel; they were all of the same virtues, and seemed nearly allied to each other in all respects. Serapio tells us, that the fruit fel was about the size of the pitachia nut, and somewhat resembled it in shape; and Avicenna observes, that it was an Indian medicine, bitter, and hot, like ginger; and that it was used as a home- chie. He also says the same of the two other fruits; whence it appears they were nearly the same thing.

FEL, in Medicine. See Call.

FEL Terra, oft of the earth, a name by which some authors have called the small century, because of its great bitterness.

FELAGUS, in our Law Books, was used for a companion or friend, who was bound to the decennary for the good behaviour of another. In the laws of king Isa, it is laid, if a murderer could not be found, the parents of the perfon slain should have fixed marks, and the king forty; if he had no parents, then the lord should have it; "et si dominus non habet, felagus ejus." Leg. Isc, cap. 15.

FELAPTON, in Legis, one of the moods of syllogisms.

In a syllogism in felapton, the first proposition is an universal negative; the second an universal affirmative; and the third a particular negative.

FELDBACH, in Geography, a town in the duchy of Stiria; 14 miles N. of Rakelburg.

FELDER, a river of Germany, which rises in Henneberg, and runs into the Werra, 2 miles N. E. of Vacha.

FELDES, a town of the duchy of Carniola; 14 miles N. W. of Crainburg.

FELDES-Nova, a lake of the duchy of Carniola; 2 miles S. W. of Feldes.

FELDKIRCH, County of, a small country of Germany, formerly in the circle of Swabia, but now a part of the Tyrolese, bounded on the north by the county of Montfort, on the east by Pludentz, on the south by the Grafen, and on the west by the Rhine.

FELDKIRCH, the capital of the above-mentioned county, well built, and situated on the Ill, near the Rhine. The inhabitants enjoy the privilege of choosing their own magistrates, and of refusing to surrender any who are under the law of the empire, and of not being summoned by any provincial judges; 28 miles N. N. E. of Coire. N. lat. 47° 12'. E. long. 9° 48'.

FELDKIRCHEN, a town of the duchy of Carinthia; 13 miles N. W. of Clagenfurt.

FELDSBACH, a river of Austria, which runs into the Danube, 3 miles below Grein.

FELDSBERG, a town of Germany, in Carinthia, belonging to the archbishop of Salzburg; 4 miles N. E. of Satsenburg.

FELDSBURG, a town of Austria; 28 miles N. E. of Vienna. N. lat. 48° 42'. E. long. 16° 45'.

FELDSSEE, a lake in the duchy of Carinthia; 8 miles N. W. of Velach.

FELDUAR, a town of Hungary, near the Danube, supported by fishing in this river; 12 miles S. E. of Symovna.

FELLE, a town of Naples, in Basilicata; 7 miles N. N. E. of Muro.

FELLE Homengers, was anciently used for the faithful subjects. But it seems the word should be written fel homeners.

FELLENBRUNN (Obt.), in Geography, a town of Austria; 3 miles N. W. of Sonneberg.

FELLENBRUNN (Unter.), a town of Austria; 8 miles N. of Korn-Neuburg.

FELLENGA, a small island in the gulf of Venice, near the coast of Itria. N. lat. 43° 52'. E. long. 14° 4'.

FELLETINO, a town of Italy, in the Campagna di Roma; 8 miles N. of Akatri.

FELLETZ, a town or district of Russia, in the government of Orel, on the left side of the river Vufia.

FELIBIEN, MICHAEL, in Geography, was born in 1625, and brought up to the church. He joined at an early age the congregation of Benedictine monks, and is author of many books on practical piety; but is more particularly known for his "History of the Abbey of St. Denis," adorned with figures, and illustrated with learned dissertations. Through the fame which he acquired by this work, he was chosen by the magistrates of Paris to write the history of that capital. In 1713 he published his prospectus of the intended work, and proceeded in the labour till he was arrested in his progress by the hand of death in 1719. It was afterwards completed in five volumes folio, and published in 1725. Morevi.

FELIBIEN, JAMES, was born, in 1625, at Chartres, and by intense application became a proficient in biblical knowledge. He obtained considerable preference in the church, and in 1695 was promoted to the archdeaconry of Voves, in which city he died, in 1716, at the age of 82. His principal work as an author was entitled "Pentateuchus Historicus, five quinque libri historici. Jofue, Judaeas. Ruth, primus et secundus Regum, eum Commentarios ex foente Hieracio, versione 70 interpretum; et variis auctoriis collig.," 4to. 1703. This was intended as a continuation et Janumfius's commentary on the Old Testament. It was written with so much freedom and boldness, that it was suppressed by a decree of council. The author obtained leave to republish it, having first pruned away its objectionable passages. The copies of the original publication are now extremely scarce, and objects of great curiosity.

FELICE, Sr. in Geography, a town of Italy; 17 miles N. N. E. of Modena.—Also, a town of Spain, in the province of Leon.

FELICIEN, Sr. a town of France, in the department of the Ardeche, and chief place of a canton in the district...
FELICITA, or FELICIA, St. a town in Italy, in the Campagna, near the coast of the Mediterranean, at the foot of Mount Circeoli, supposed to be built on, or near the site of the ancient Circei, but not well inhabited; 10 miles S.W. of Terracina.

FELICITY, in Mythology, a deity both among the Romans and the Greeks. The Romans had multiplied their divinities to a great number before they elevated Felicity to this rank. It was above 600 years after the building of Rome, that Lucretius, upon his return from the war with Mithridates and Tigranes, built a temple to her. Pliny adds (l. 35. c. 12.), that this general enjoined the Iturian Archebius to make the flute of that goddess; but that they both died before it was finished. Lepidus, general of the cavalry, had also, according to Dion (l. 44.) dedicated a temple to that goddess. The Greeks, likewise, honoured the same goddess under the name of Eudaimonia and Macaria. Felicity is often represented upon the Roman medals, either under the figure of a woman holding in her hand the cornucopia, or under some other symbol, with the legend "Felicitas Publica," or "Felicitas Aug. Felicitas Temporum."

FELICUDA, in Geography, one of the Lipari islands, and usually called Phenicusa. N. lat. 38° 34'. W. long. 14° 2'. This island, as well as Alicudi, which are the two extreme Liparian islands towards the west, display proofs of their having anciently contained volanences. In Felicuda there is a spacious cavern, called the Grotto of the Sea-ox, which, from an aperture of 40 feet high, opens into a hall near 220 feet long, 120 broad, and 68 high. This cavern is formed of lava, and is only accessible by sea. Spallanzani (vol. iii. p. 99.) supposes, that it was occasioned by the action of the gases in the lava, when fluid; as there are examples in various caverns, much deeper, produced by a similar cause.

FELIPE, St. a town of Mexico, in New Biscay; 56 miles N.W. of Parrel. — Also, a town of Mexico, in the province of Mechoacan; 100 miles N. of Mechoacan. — Also, a town of Spain, in the province of Valencia, situated on the declivity of a mountain, at the foot of two castles; which form an amphitheatre. It was formerly called Xarimia, and was once one of the most beautiful towns in Spain; but as it took part with Charles III. in 1707, Philip V. ordered it to be demolished, and called a new town to be built, which he called St. Felipe; 29 miles S.S.W. of Valencia. N. lat. 39°. W. long. 3° 46'. — Also, a town of South America, in the province of Venezuela; 70 miles S. of Venezuela. — Also, a town of New Mexico, in New Navarre; 85 miles W. of Cafie Grande. — Also, a bay called St. Jorge, on the N. coast of Terra Australis del Espiritu Santo, discovered by Quiros in 1606. S. lat. 45° 35'. E. long. 167° 8'. — Also, a town of New Mexico, on the Bravo; 49 miles S. of Santa Fé. — Also, a town of Brazil, formerly called "St. Luis de Marignon," capital of the jurisdiction of Maranhao. S. lat. 2° 30'. W. long. 45° 36'. — Also, a town of Brazil, in the jurisdiction of St. Paul. — Also, a town of the island of Cuba; 55 miles S.E. of Havana.

FELIS, in Zoology, a genus of quadrupeds in the order F.I.R.S., the essential character of which consists in having fore teeth, the intermediate ones equal; grinders three each side; tongue belted with bristles backwards; and the claws retractile.

This ferocious tribe, confounding altogether of about 23 species, besides an amazing number of varieties, is distinguished by their sharp and formidable claws, which are lodged in a sheath, and are capable of being extended or drawn in at pleasure. They lead a solitary and ravencous life, and never unite for mutual defence or support like those of the herbivorous kinds of animals, but seek their food alone, and are frequently enemies to each other. Though differing greatly in size and colour, they are allied to each other in disposition, being fierce, rapacious, and artful, and are ended also with considerable strength. They run with speed, easily climb trees, and when falling from a height alight on the feet. They are carnivorous, and refuse vegetables, unless extremely pressed by hunger. When in sight of their prey, they wave their tails, and seize it by a sudden spring. The females bring forth several young at a birth, and have eight teats, four of which are pectoral, and four abdominal.

Species.

LEO. Tail long; body pale tawny. Felis leo, Linn. Felis çauda elongata, corpore belvcolo, Schreb. Felis çauda in floccum defuncte, Briff. Leo, Gennner, &c. Lion.

The form of the lion is strikingly bold and majestic, corresponding with the generosity of his nature; and from the magnitude of his size, his strength, agility, and courage, he reigns the superior of all other quadrupeds. A lion of the largest dimensions measures about eight or nine feet in length, from the nose to the base of the tail, and the latter itself nearly four feet. Throat of smaller size, when full grown, are about five feet long, independently of the tail. The aspect of the lion, when he presents his front full to the view of the observer, is impressively grand; his head large and rounded, his forehead square, his shaggy flowing mane, which he can erect at pleasure, surmounting his awful front, his huge eye-brows, his round and fiery eye-balls, his pendulous lips, and formidable armament of his teeth, conspire altogether to render his appearance terrific. The ears of the lion are small, and of a rounded form; his face covered with short and close hair, of a pale tawny colour; the mane, descending from the upper part of the head, falls over the shoulders, and hangs down almost to the knees; the belly and breast are covered likewise with long hair. The red of the body is covered with very short hair, excepting the point of the tail, which is furnished with a bushy tuft. The hinder parts of the lion are rather disproportionate to the front, his posterior limbs being comparatively longer, and the latter have besides a naked appearance when contracted with the flappiness of its anterior aspect. The legs are fleshy and muscular; the length of the claws is about an inch and a quarter, very hooked, and of a whitish colour; the claws being retractile, can be extended or withdrawn into the membraneous sheath at pleasure, and their points are generally acute, as they are never extended, except when the animal feeds on its prey. The lioness is smaller than the lion, being fearfully three-fourths the size of the latter; she is also deficient of the mane, and her fur is of a whiter cast on the sides and belly.

It has been observed generally, by some writers, that in warm climates quadrupeds usually attain to a far more considerable size, and are naturally stronger than in the cold or temperate climates, and that they are likewise more fierce and hardy, as their natural qualities seem to correspond with the aridness of the climate. This remark can apply only to certain tribes, or at least admits of many exceptions; but with regard to the lion in particular it is strictly true. The lions, naturally the inhabitants of the hotter regions of the earth, thrive best in the burning waves of the torrid zone; in those deserts whence mankind are driven by the rigorous heat
heat of the climate, the lion reigns sole master; its disposition seems to partake of the ardour of its native soil, and under the influence of a burning sun it becomes larger, more powerful, fierce, and terrible than in other parts of the globe. It is thus that the lions of mount Atlas, whose summits are often times covered with snows, are neither to be feared nor so fierce as those of Bleduggerid or Znaor, or the deserts in the interior of the vast continent of Africa. In those barren wastes the lion is the dread of travellers, and the scourge of the neighbouring provinces. Happily the species is not numerous, and is said to be diminishing in number; for if we may credit the testimony of those who have traversed these regions within the space of the last century, the number of lions is not near so considerable as they were formerly, and their number indeed appears to decrease daily. The Romans brought many more lions out of Libya in one year for their public spectacles than could be found at this time in the country. Scylla, the dictator, for example, exhibited during his pretorship a hundred lions; but in this respect he was far excelled by Pompey the Great, who brought together in the grand Circus no less than six hundred animals of this species, three hundred and fifteen of which were males; and it is recorded also of Caesar the dictator, that he collected altogether no less than four hundred for the same purpose, that of public exhibition. It is remarked by modern writers, that the lions of Turkey, Persia, and the Indies are less numerous than formerly; and indeed we are assured by the belt of the late French travellers, that there are at present no lions throughout Turkey.

As this formidable and courageous animal makes a prey of most other animals, and himself the prey of none, this diminution in the number of the species can be attributed only to the increased population of mankind: and it is also well observed, that the courage of this animal diminishes, and its caution and timidity become greater as it approaches the habitations of the human race. The quality of his courage, though natural, is exalted or depressed according to the success with which he is accustomed to employ his forces. In those regions, the exclusive empire of which has been reserved to him by man, the lion is alone formidable. Acquainted to measure his strength by that of all other animals which he encounters, the habit of conquest renders him haughty and intrepid. Having never experienced the strength of man, or the power of his arms, instead of betraying fear at his approach, the lion disdains and sets him at defiance. Wounds irritate but do not terrify him; neither is he dismayed at the sight of numbers. A single lion of the desert has been known to attack a whole caravan; and if, after a violent and obilinate engagement, he found himself weakened, he retreats fighting, and always keeping his face to the enemy. But acquainted with man, and the power of his arms, or ingenuity, he loses his natural fortitude, and feels sensible of his inferiority; and hence the lion, in the neighbourhood of the villages of the Indians and Africans, has been known to fly before women, and even children, and suffer itself to be driven by them from its lurking-place.

This alteration in the disposition of the lion sufficiently demonstrates that it will admit of a certain degree of education. The page of history informs us of lions voked in triumphal chariots; that of Maik Antony, when he appeared in the streets of Rome, accompanied by his mitrels Cytheris, was drawn by lions; and other instances of a similar nature might also be adduced. Lions have been occasionally trained to the arts of war, or the chase, by the ancients, and it is affirmed of thee, that they never employed their strength or courage but against their enemies. The lion (says Buffon) when taken young, and brought up among domestic animals, is easily accustomed to live, and even sport innocently with them. He is gentle and carorous to his master, and if he sometimes returns his natural ferocity, he seldom turns his rage against his benefactors. He has also been known to disdain the inflicts, and pardon the offensive liberties of weaker animals. When led into captivity, he discovers symptoms of meekness, without anger or perverseness; on the contrary, he assumes the habits of gentleness, obeys his master, cares for the hand that feeds him, and sometimes spares the animals that are thrown to him for prey.

By this act of generosity he seems to consider himself as for ever bound to protect them; he lives peaceably with them, allows them a part of his food, and will rather submit to the inconveniences of hunger than destroy the fruits of his own benevolence.

Notwithstanding this generosity and placability of disposition, it should however be remembered, that the piaisons of the lion are impetuous and vehement, and it is not to be expected, that on all occasions the impressions of education will be sufficient to counterpoise them. We are all so affected, from ocular observation, that the keepers of these animals frequently play with them and with a degree of familiarity, little short of temerity, put their hands into their mouths, pull out their tongue, or hold them by the teeth, or even beat them, all which the animal seems to bear with fallen composure. But it is nevertheless dangerous to let the lion suffer from hunger, or provoke him by ill-timed teazings; the mildness of his temper is liable to irritation, and has been known to refer the imprudent chaitlements of his keeper. Labat informs us of a gentleman who kept a lion in his chamber, and employed a servant to attend it, and who as usual mixed his caruries with blows. This was borne by the lion for some time. One morning, however, the gentleman was awakened by an unusual noise in his room, and drawing his curtains aside he perceived it to proceed from the lion, which was growling over the body of the unhappy man, whom it had just killed, and had separated his head from his body. The terror and consternation of the gentleman may be easily conceived; he flew out of the room, and fortunately obtained sufficient assistance to secure the animal from committing further mischief.

The appearance of the lion is truly expressive of the magnanimous qualities of his nature, his gait is stately, his looks determined, his eyes glowing with peculiar lustre, inspire terror, and his voice is tremendous. The force of his muscular strength is apparent from his prodigious leaps and bounds, which often exceed twenty feet; by the lively motion of his tail, a single sweep of which is sufficient to throw a man to the ground; by the facility with which he moves the skin of his face, and the facility of erecting and agitating the hair of his mane when irritated.

Lions are very ardent in their amours; when the female is in season, she is often followed by eight or ten males, who roar incessantly, and enter into furious engagements till one completely overcomes the rest, takes possession of her, and carries her off to some secret recess. All the piaisons of the lion, the last passion of love not excepted, are excessive. From the reports of the French naturalists, the amours of these animals differ in no respect from those of the common cat, and frequent opportunities have occurred of late years in the menagerie of the museum of national history in Paris to verify the truth of this observation; they are not on those occasions more cordial than the cat, and like that animal growl and wrangle as though offended with each other, the female especially. The lions is naturally weaker and more timid than the lion, but such is the
the strength of her attachment for her young, that for their support she becomes more ferocious and terrible than the lion himself, makes her excursions with more boldness, attacks and destroys without distinction all other animals, and carries them seeking to her cubs, whom she thus instructs to suck their blood, and tear their flesh. She brings forth her young in the most secret and inaccessible places, and when afraid that their retreat will be discovered, endeavours to conceal the traces of her feet, by returning frequently on her flees, or effacing them by bruising the ground with her tail. When the danger is greater, she will sometimes transport her young from one place to another in her mouth, or if obstructed in this attempt to save them she becomes furious, and defends them to the last extremity.

The length of time the lioness goes with young is variously stated by different writers; Elian says two months, and Philostratus six months; among the moderns the period of gestation is said to be five months, and the best authors seem to agree in this conclusion. From very recent observation, it nevertheless appears that neither of the above statements is correct; it has been clearly ascertained by La Cépée, that the lioness goes with young one hundred and eight days, or rather more than three months and a half. The number of young brought forth by the lioness at a time is also generally misrepresents. Aristotle believed that at the first birth the lioness constantly produced either five or fixed young; most commonly only five; and at each succeeding litter progressively one less, till the brought forth but a single whelp, and after that the became barren. This early naturalist was deceived, but his information is nevertheless more just than that of other ancient writers before his time, who supposed the lionesses never produced but a single litter, the young, instead of being brought forth as in other animals, tearing an opening through the side of their mother, and thus effecting their escape, at the expense of her life. Among the writers of later times it is universally admitted that the lioness has several litters in her life, and at each birth produces about three or four whelps. The lionesses occasionally breeds in a state of confinement in Europe, instances of which are known in Britain; but whether the time of gestation in these animals has been well determined by the observation of English naturalists seems rather doubtful. A lioness in the menagerie at Paris, about two months gone with young, produced an abortive birth of two fœtuses, the skin of which was perfectly smooth, the hair not having at that period began to grow. Twenty-one days after this the female was in heat, and was known to receive the embraces of the lion five several times in the same day. From that time every symptom of pregnancy appeared; and on the 108th day after, at seven in the morning, the pains of birth commenced; at five in the evening, the usual hour of repast, the lioness in vain attempted to eat the food presented to her, the pains, almost every instant repeated, compelling her to abandon it. The keeper, observing this, entered the den, and made the animal swallow some olive oil, which seemed rather to relieve her; about ten o'clock the brought forth a living whelp; in half an hour after another, and a third at a quarter past eleven. The above were all males. This occurred in November 1801. About the end of March following the male was again admitted to the same lioness, and on the 15th of July 1802, she had a litter of two female whelps, so that the period of gestation in the latter instance was much the same as in the former.

The lions, when first born, are rather larger than a half-grown kitten; at least three or four we have seen that were brought forth in the Tower did not exceed that size, or about a foot in length from the back of the head to the origin of the tail. Their colour is a mixture of reddish and grey, with a number of small brown bands, which are most distinct on the dorsal spine, and near the origin of the tail; and these stripes scarcely disappear in the whelp a twelve-month old, and they continue at the satin about the same time. The mane of the male begins to make its appearance when the animal is about three years, or three years and a half old: the age of maturity is said to be about the sixth or seventh year, in the female at the fifth year.

Naturalists are not agreed as to the ordinary period of life in this animal, which is variously stated, from about 20 to 50 years or more. Buffon, reasoning from the size and constitution of the lion, and the time required for his arriving at his full growth, concludes that it ought to be about 25 years, or even times the space of three or four years, as it has been affected of the lion that he acquired maturity in three or four years after his birth. It is, however, ascertained, that in some instances the lion lives much beyond that time. The great lion called Pompey, which died in the Tower, is recorded to have lived in captivity above 70 years; and one brought from the river Gambia died there a few years since at the age of 63.

The lion seldom quits his den, or goes abroad in the middle of the day, but commences his depredations at twilights, and returns before the morning. The roaring of the lion, when in quest of prey, is said by Buffon to resemble the sound of distant thunder, and, being echoed by the rocks and mountains, appalls the whole race of animals, and puts them to sudden flight; but he frequently varies his voice into a hideous scream, or yell. The lion, when hungry, will attack any animal that presents itself; but he is so formidable that all endeavour to avoid him, and this circumstance often compels him to conceal himself, and lie in wait, that he may take his prey by surprise. For this purpose he sneaks on his belly, some whitethat his prey approaches, and then with a prodigious leap he seizes it at the first bound. Should he miss the object, we are told he deftly's from farther pursuit, and, turning back towards the place of his ambush, measures the ground step by step, and again lies in wait for another opportunity.

The lurking place of the lion is generally chosen near a spring, or by the side of a river, where he has an opportunity of surprising such animals as resort to the water to quench their thirst. In burning deserts, where rivers and fountains are denied, they live in a perpetual fever, a fort of madness fatal to every animal they meet with. The lion is supposed to be deft at ascertaining that superior degree which most animals of prey possess, and to hunt by the eye alone. Many historians have even represented him as incapable of finding his prey except by accident, and that he is obliged to the jackal, a quadruped of excellent sense, for the discovery of it. This is an erroneous supposition; the jackal does not attend the lion to provide for him, but, being a small and fierce creature, follows his track to pick up the refuse of such animals as the lion defrosts, and does not confide entirely to devour. The strength of the lion is so prodigious, that it is even affirmed a single stroke of his paw is sufficient to break the back of a horse, and that he carries off a middle-sized ox, or buffalo, with ease. The lion is said to devour as much food at once as will serve him for two or three days, and when fatigued to remain in a state of rest or retirement in his den, till impelled again by hunger to leave it, and prowl in search of prey. The reveried bristles with which his tongue is beset are so large and strong, that he readily lacerates the skin of other animals; and his teeth so powerful, that he breaks and crushes the bones;
bones with perfect facility, and often swallows them with the flesh. It is estimated that about fifteen pounds of raw flesh is sufficient for the ordinary subsistence of each lion daily. He endures hunger better than thine, and laps in drinking like a dog. The roaring of the lion is strong and loud, but when he is irritated his cry is shorter, repeated more suddenly, and is still more terrible than the roaring; besides which, at such times he beats his sides with his tail, flamps with his feet, erects and agitates the hair of his head and mane, moves the skin of his face, shows his teeth, and lolls out his tongue. According to Dr. Sparrman, "the roaring of the lion confits in a hoarse articulate sound, which at the same time seems to have a hollowness in it, something like that proceeding from a speaking trumpet. The found is between the German n and an s, being drawn to a greater length, and appearing as if it came from out of the earth; at the same time, that after listening with the greatest attention, I could not exactly hear from what quarter it came. The found of the lion's voice does not bear the least resemblance to thunder, as M. de Buffon, tom. ix. p. 22, from the voyage of Boullaye de Gouy, affirms it does. In fact, it appeared to me neither peculiarly piercing nor tremendous; yet, from its flow prolonged note, joined with nocturnal darknes, and the terrible idea one is apt to form to one's self of this animal, it made me shudder, even in such places as I had an opportunity of hearing it in with more satisfaction, and without having the least occasion for fear. We could plainly perceive by our cattle when th' lions, whether they roared or not, were reconnoitering us at a small distance. For in that case the hounds did not dare to bark in the leaf, but crept quite close to the Hottentots; and our oxen and horses fledged deeply, frequently hanging back, and pulling slowly with all their might at the strong irons with which they were tied up to the waggons. They likewise laid themselves down on the ground and stood up alternately, appearing as if they did not know what to do with themselves; or rather, just as if they were in the agonies of death. It is indeed a wonderful circumstance that the brute creation should have been taught merely by nature to be in dread of the lion; for our horses and oxen were all from places where I am certain they could have no knowledge of this dreadful adversary of theirs; so that in this we must admire the bounty of providence, which, while it has sent such a tyrant as the lion amongst the animal creation, has likewise taught them to discern and distinguisli it with trembling and horror." We might naturally conclude that the roaring of the lion would prove serviceable to the other animals, by operating as a warning for them to betake themselves to flight; but as he puts his mouth to the ground when he roars, the sound is diffused equally to a considerable surrounding distance, and it is hence impossible to distinguish the precise spot from whence it issues. This increases the alarm; the intimidated animals fly backwards and forwards in all directions, and being dark, very often run to the very place from whence the sound proceeds, and which they meant to avoid. When the lion walks, his gait is lately, grave, and slow, though in an oblique direction. His movements are not, however, equal, but consist of leaps and bounds, which prevent him from stopping suddenly, and make him often overleap his mark. Should he chance to miss his prey, the Hottentots affirm that he turns slowly round towards the place where he lay in ambush, proceeding thither step by step, and, as it were, measuring the exact length between the two points, in order to find how much he exceeded or fell short of the mark to which his leap had been directed.

Vot. XIV.

The character of the lion for courage and generosity is to be admitted, according to Dr. Sparrman, with considerable abatement. "It is not in magnanimity, fays this writer, as many will have it to be, but in an audacious and cowardly disposition, blended with a certain degree of pride, that the general character of the lion consists; though hunger must naturally have the effect of now and then inspiring its courage. Moreover, being accustomed always itself to kill its own food, and that with the greatest ease, as meeting with no refiistance, and even frequently to devour it reeking and weltering in its blood, it cannot but be easily provoked, and acquire a greater turn for cruelty than generosity; but, on the other hand, not being accustomed to meet with any refiistance, it is no wonder that, when it does, it should sometimes be faint-hearted and crot-fallen. A yeoman, a man of veracity (Jacob Kok, of Keehoe river), related to me an adventure he had, in these words: 'One day walking over his lands with his loaded gun, he unexpectedly met with a lion. Being an excellent shot, he thought himself pretty certain, in the position he was in, of killing it, and therefore fired his piece. Unfortunately he did not recollect that the charge had been in it for some time, and consequently was damp, so that his piece hung fire, and the ball, falling short, entered the ground close to the lion. In consequence of this he was seized with a panic, and took directly to his feet; but being soon out of breath, and closely pursued by the lion, he jumped up on a little heap of stones, and there made a stand, presenting the butt end of his gun to his adversary, fully resolved to defend his life as well as he could to the utmost. My friend did not take upon him to determine whether this pition and manner of his intimating the lion or not: it had, however, such an effect upon the creature, that it likewise made a stand, and, what was still more singular, lied itself down at the distance of a few paces from the heap of stones, seemingly quite unconcerned. The sportsman in the mean while did not dare to flir a step from the spot: besides, in his flight, he had the misfortune to lose his powder-horn. At length, after waiting a good half hour, the lion rose up, and at first went very slowly; and step by step, as if he had a mind to steal off, but as soon as it got to a greater distance it began to bound away at a great rate.'"

The same author relates also another occurrence to the same effect, but which, being attended with circumstances more remarkable than the former, has been more frequently repeated: the story is interrelling, and ought not to be omitted. "An elderly Hottentot, fays this writer, in the service of a Christian, near the upper part of Sunday River, on the Camdebo side, perceived a lion following him at a great distance for two hours together. Thence he naturally concluded that the lion only waited for the approach of darknes in order to make him his prey; and in the mean time could not expect any other than to serve for this fierce animal's supper, inasmuch as he had no other weapons of defence than a club, and knew that he could not get home before it was dark. But as he was well acquainted with the nature of the lion, and the manner of its feizing upon its prey, and at the same time had leisure between whiles to ruminate on the ways and means in which it was most likely that his exciteuce would be put an end to, he at length hit upon a method of saving his life. For this purpose, instead of making the beast of his way home, he looked out for a slip krent (to they generally call a rocky place, level and plain at the top, and having a perpendicular precipice on one side of it), and fitting himself down on the edge of one of these precipices, he found, to his great joy, that the lion likewise made
made a halt, and kept the same distance as before. As soon as it grew dark, the Hottentot, sliding a little forwards, let himself down below the upper edge of the precipice upon some projecting part or crest of the rock, where he could just keep himself from falling. But in order to cheat the lion still more, he set his hat and cloak on the block, making with it, at the same time, a gentle motion just over his head, and a little way from the edge of the mountain. This crafty expedient had the desired success. He did not stay long in this situation before the lion came creeping softly towards him like a cat, and mistaking the skin cloak for the Hottentot himself, took his leap with such exactness and precision, as to fall headlong down the precipice directly close to the snare which had been set up for him."

This is not the only instance of the lion being ensnared by a stratagem of this kind. In the out-houses and wide grounds about farms, where a lion has been upon the watch for some animal and missed it, or where they have reason to expect one, they set up the figure of a man, close to the face of which had been put; they let these discharge themselves into the body of the beast at the very instant that he springs, or throws himself upon the dressed figure. This is done with so much care and success, that they fearlessly ever think it worth the trouble in Africa to take the lions alive, nor are they often at the pains to construct pit-falls for their capture.

Dr. Sparrman remarks, as a singular trait in the history of the lion, that though, according to many, it always kills its prey immediately if it belongs to the brute creation, it contents itself, however provoked, with merely wounding the human species in the first moment of seizure; or at least to wait some time before he gives the fatal blow to the unhappy victim. In several places through which the traveller passed, the natives mentioned to him by name a father and two sons, who were said to be still living, and who, being on foot near a river on their estate in search of a lion, were unexpectedly surprised by him; the foremost was thrown down by him, but the other two had full time to shoot the lion dead on the spot, after he had lain close to the figure. It was done so as not to make the distinction between the monsters, and did not relate to them, without having done him any particular injury. He also saw, near the upper part of Duyven-booek river, an elderly Hottentot, who, at that time had under one eye, and beneath the cheekbone, the ghastly marks of the bite of a lion, which did not coadjoin to give him any other chastisement for having, in company with his brother, hunted him with intrepidity, though without success. It was related likewise of a farmer and captain in the militia named Bota, who had lain for some time under a lion, and had received several bruises from the beast, besides being bitten very much in one arm, but who in a manner had his life given him by this noble animal.

"I do not rightly," says Dr. Sparrman, "know how to account for this merciful disposition towards mankind. Does it proceed from the lion's greater respect and veneration for man, as being an equal to, or even a mightier tyrant than him, among the animal creation? Or is it merely from the same caprice which has sometimes induced him not only to spare the lives of men or brute creatures, who have been given up to him for prey, but even to care for them and treat them with the greatest kindness? Whims and freaks of this kind have, perhaps, in a great measure, acquired the lion the reputation it has for generosity; but I cannot allow the fictitious name, sacred only to virtue, to be lavished on a wild beast. Slaves, indeed, and wretches of servile minds, are wont with this attribute to flatter their greatest tyrants; but with what show of reason can this attribute be beffowed upon the most powerful tyrant among quadra-

peds, because it does not exercise an equal degree of cruelty upon all occasions? That the lion does not, like the wolf, tiger, or some other beasts of prey, kill a great deal of game or cattle at one time, perhaps proceeds from this, that while he is employed in attacking one or two of them, the remainder fly farther than it agrees with the natural indulgence of this beast to follow them. If this be called generosity, a cat may be styled generous with regard to rats; as I have seen this creature in the fields, among a great number of the latter, where she could have made a great havoc at once, feize on a single one, and run off with it. The lion, and the cat likewise, very much resemble each other, in partly sleeping out, and partly paling away, in a quiet inactive state, a great part of their time in which hunger does not urge them to go in quest of their prey."

The strength of the lion, according to the same interesting traveller, is very considerable. He was informed that the animal was once seen at great peril to take a heifer in his mouth, and though the legs of the latter dragged on the ground, yet he seemed to carry her off with the same ease that a cat does a rat; and it had likewise in its course to leap a broad dyke, which it accomplished without difficulty. This happened near Boshfierman river; the lion was perceived by a hunting party of Hottentots dragging his prey from the plain to a neighbouring woody hill; they however pursued, and forcing the lion to leave it, made a prize of it themselves. The lion is however said to be not sufficiently powerful to overcome an animal of such strength and size as the buffalo, without having recourse both to agility and stratagem. With this view it feeds on the buffalo, and fattens with both its jaws upon the muscle and nostrils of the beast, and keeps squeezing them close together, till at length the creature is strangled, weared out, and dies. Attacks of this kind have been witnessed by the colonists, and the buffaloes have sometimes escaped, bearing at the same time the marks of the lion's claws about their mouth and nose. The lion on such occasions ventures, however buffaloes should approach, he would not fail to attack the lion, and the strength of the two buffaloes would be more than sufficient to overpower their assailant. The lion, it is said, unless prefed with hunger, will not always attack the buffalo; a traveller had once an opportunity of seeing a female buffalo with her calf, defended by a river at her back, keep for a long time at bay five lions which partly surrounded her; but did not, at least as long as the traveller looked on, dare to attack her. There is an instance also recorded of a lion being trampled to death by a herd of cattle, which he was urged to attack (probably by hunger) in the broad daylight.

At the Cape the lion is frequently hunted by the colonists both for the sake of the flesh, which, though possessing a strong and disagreeable flavour, is eaten by the negroes; and also for the skin, which those people use as a mantle, or a bed. In the day time, and on the open plain, from ten to sixteen dogs will easily overcome a lion of the largest size. Nor is there any necessity that the dogs with which the lion is hunted should be very large, and trained up to the sport, as Buffon thinks they ought to be, the object being perfectly well accomplished with the common farm-houle dogs. As the lion is less swift than the dogs, the latter easily approach him, when, from a greatness of soul, and a fullness degree of magnanimity, the lion turns round, and waits for the attack, making his mane, and roaring with a short and sharp tone, or fits down to face them. The hounds then surround him, and, rushing upon him, all
Felis. at once, are thus, by their united efforts, able to subdue, or tear him in pieces: he has seldom time to give more than two or three strokes with his head, each of which is attended with the death of one of his affluents.

Buffon affords that the lion may be hunted on horseback, but that the horses must be trained to it, which, however, Dr. Sparrman affirms us, is not the case, as the colonists hunt the lion with common hunting horses; the latter he describes as being in pursuit of this formidable animal as if in that of the antelope "Our horses," says he, "the very same as had several times, in the manner above-mentioned, shown their disquietude when the lion happened to be in the vicinity of them, and which were not in the least trained to the chase, once exhibited a spirit in the pursuit of two large lions equal to that which they had shown at other times in chasing the timid gazelles; though in fact hunting horses seem to partake much more of the master's pleasure in the chase. I remember in particular, at Agier Bruniyes Hongrie, I rode a horse, which, by a tremendous sound issuing from its chest, cocking up its ears, and prancing and capering, discovered, in an equivocal manner, its armour in the chase, whenever it came in sight of the larger kind of game. There have even been instances of hunting horses, who, when the hunter has jumped off their backs in order to discharge his piece, but has miffed his mark, have, in their eagerness for the chase, not allowed him time sufficient to mount again, but followed the game alone for hours together, elate at its very heels, in all its turnings and windings." This armour for the pursuit of the lion is only known, however, we are to remember, according to Dr. Sparrman, by the horses trained to the purposes of hunting; for he has told us on another occasion, that their common horses, as well as their oxen,figured deeply, and betrayed such symptoms of fear, as even to lie down panic-struck when the lions were reconnoitring them; and these assurances seem strongly to confirm the observation of Buffon; namely, that it is necessary the horses with which the lions are hunted should be trained to the purpose, or he at least accustomed to the pursuit of beasts of prey, and the perils attendant on their chase. It furthermore appears from the same author, that it is only on the plains that the hunters ever venture to go out on horseback in this chase. If the lion remains in the coppice or wood on a rising ground, they endeavour to tease him with the dogs till he comes into the plain. They also go in parties of two or three together, or even more, in order to affit and rescue each other, in case the first that should not take place. When the lion sees the hunters at a great distance, it is allowed universally that he flies from their approach with all possible speed, in order to escape; but if they chance to discover him at a small distance only from them, he retires with fallen dignity, and at a slow pace, as though he were about preparing by his silence any further sign of apprehension. This, therefore, also shows that when pursued with vigour, he is soon pressed to resist, or at least disinclines any longer to fly. He slackens his pace, and at length only flees slowly off, leap by leap, at the same time watching his pursuers obliquely, till he finally makes a full panche, and, turning round upon them, makes his mane, rows with a short and sharp tone, expressive of his intention, and appears ready to seize on them, and tear them in pieces. This is the moment for the hunters to be on the trot, or within a convenient distance, to commence the attack; not in a body, but at proper intervals from each other. The foremost huntsman, or he that is most advantageously placed, and has the best mark of that part of the lion's body nearest his heart or lungs, must be the first to jump off his horse, and, securing the bridle by putting it round his arm, discharge his piece; then, in an instant recovering his hat, must ride off, and the second to discharge his companion, and in due giving his horse the reins, must run entirely to the side and fear of the latter to convoy him beyond the reach of the lion, should he have only wounded him, or absolutely missed him. Under either of these circumstances a fair opportunity presents itself for some one of the other hunters to jump off his horse immediately, as he may then discharge his piece with effect, and save his companion. If this shot should miss likewise, a third sportsman rides after the lion, which at that time is in pursuit of the first or second, and, springing off his horse, fires his piece as soon as he arrives within a proper distance, and the animal presents itself in a favourable position. In the event of the lion turning again and attacking this pursuer, the other hunters return to his refuge with their pieces ready charged, having loaded them on horseback while flying from the wild beast. No instance, it is said, has ever been known of any misfortune happening to the hunters in chasing the lion on horseback. The remote parts of Africa are most exposed to the ravages of wild beasts, and the colonists in those districts, from the habits of hunting them, become excellent marksmen. The lion, which has the hobbets to seize on their cattle, the most valuable part of their property, and that sometimes even at their doors, is as odious to them as he is dangerous and injurious; and hence they consequently seek out his lurking places, and pursue him with the greatest ardour and delight.

It is rather with the view of exterminating these formidable beasts of prey that the Africans hunt them; though, as already observed, the flesh is eaten by the negroes: the great all, which is of a penetrating nature, is used in medicine, and their skin serves as a cloak or mantle, and was formerly used as such only by persons of distinction. On some occasions also lions seem to constitute a part of the established pomp of royalty in the eastern world. The monarch of Perhia, as appears from the travels of Mr. Bell, has on the days of audience two large lions, secured by means of golden chains, on each side the entrance of the hall of state.

The anatomy of the lion is described by Bartholinus in 1671, and in the Transactions of the Royal Society of Edinburgh for 1771.


It is difficult to form any just conclusion either as to the size or beauty of this tremendous animal from the individuals retained captive from early life in our menageries; and where, from the smallness of their dens, and consequent uncleanliness, their want of exercise, and those habits of life which render them robust, their growth must necessarily be impoverished, and their parts exhibit an infinitely less degree of brilliancy than when they roam at large in their native deserts.

The size of this animal, according to some authors, is larger, and, according to others, rather smaller than the lion; and in this respect the companion of our present travellers vary materially, some affirming that it is the size of the deer, others of the horse, and some again in even of the buffalo. There indeed appear to be two or more distinct animals confounded under the general name of tiger, in the same manner as the panther has been called the tigre, and the jaguar the panther; and all, as well as the jaguar, are
indiscriminately termed tigers by various writers, a circum-
stance that has given rise to no small degree of confusion.
The true tiger is the largest and most powerful of these ani-
mals, and which has obtained the appellative of the royal
tiger in testimony of his pre-eminence. Buffon relates, on
the authority of M. de Lalande Magon, that the latter had
seen a tiger in the East Indies fifteen feet in length, includ-
ing the tail; but this even is inferior to others recorded by
travellers. L'Abbé Richard says they have tigers at Tonquin
eighteen feet in length. The height of the tiger, according
to Fonte d'Obbontonville, is four feet ten inches, and the
length nine feet from the front to the base of the tail; and
Grandpré, in his voyage to India, describes tigers as large
as oxen.

Tigers are peculiar to Asia, and are not, as some authors
suppose, inhabitants of the new continent; and moreover
they are confined to the warmer parts of Asia, and prin-
cipally to India and the Indian islands, though the species
extends as far north as China and Chinefe Tartary. They
abound most in Malabar, Bengal, and the kingdom of
Siam, and Tonquin.

A more beautiful animal than the tiger does not exist; he
is as unrivalled for the brilliancy and elegance of his fur,
as for his distinction for his ferocity, and the want of every
quality which, as a beast of prey, could palliate the nature
of his disposition. His whole figure is expressive of the powers
of his strength and activity. The head is short and roundish,
the ears short, and the armament of his teeth truly formidable.
The general colour of his fur is a deep tawny,
or yellow orange, which is of a deeper hue on the back
than the sides; and the face, throat, and under-side of the
belly are nearly white: the whole body is traversed by numer-
ous perpendicular fripes of black, and the tail is also annu-
lated with the same. In different individuals the colours
vary in the brightness of the yellow-orange, which consti-
tutes the ground-colour of the fur, and the intensity of the
bands of black, with which it is relieved; these bands are
in some parts double, in others single, and are fewer in num-
ber about the head and under parts of the body than on the upper.
The tiger is the most rapacious of all carnivorous
animals; fierce without provocation, and cruel without ne-
cessity, his thirst for blood is insatiable; although glutted
with barren he is not appeased; he feizes, and tears in
pieces every animal with equal fury and rapacity, nor ever
defails so long as a single object remains in sight that he can
vanquish; he lays waste the country he inhabits; flocks and
herds fall indiscriminately victims to his fury, his cruelty,
and cunning; he attacks the elephant, the rhinoceros, and
even the lion himself; he neither fears the sight nor the
opposition of men, whom he frequently makes his prey,
and is even said to prefer human flesh to any other. The
tiger seems to have no other Inlent than a constant thirst
after blood, and which often stimulates him to devour his
young, or the cubs to tear the mother in pieces for defending
them. Sometimes he lies in wait on the banks of rivers,
where he may catch the fish along with other animals to repay
for drink, but from the velocity of his flight he is equal to
the chase of the fleetest animals, and oftentimes pursues
them to their inevitable destruction.

The strength of the tiger is so great, that when it has
killed a deer, or a bole, or even a buffalo, it carries off the
prize with such ease, that it seems no impediment to its
flight. This it does to prevent interruption, as it can devour
the slaughtered animal in the woods more at its leisure. The
moment the animal he attacks is overcome, it plunges its
head into the body, as if to satiate itself with the blood; and
when large it commonly tears out the entrails to facilitate
its conveyance to the retreats of its lurking place.

Neither force, restraint, nor violence can subdue the fer-
city of the tiger; he is equally irritated with good as bad
treatment, and is so indefatigable of its keepers, that he would
equally tear the hand that feeds him, as that by which it is
chastised. It is nevertheless admitted that the tiger, when
very young, has much playfulness and some docility. In
Bewick's quadrupeds it is related, that a young male tiger,
lately brought from China in the Pitt East Indianman, at
the age of ten months, was so far domesticated, as to allow
every kind of familiarity from the people on board. It
seemed to be quite harmless, and was as playful as a kitten.
It frequently slept with the sailors in their hammocks, and
would suffer two or three of them to repose their heads upon
its back as upon a pillow, whilst it lay stretched out upon the
deck. In return for this it would, however, now and
then eat their meat. Having one day taken a piece of
beef from the carpenter, he followed the animal, took the
meat out of its mouth, and beat it severely for the theft,
which punishment it suffered with all the patience of a dog.
It would frequently run out on the bowprit, climb about
the ship like a cat, and perform a number of tricks, with an
elegance and dexterity that was truly admirable. There was
described to the ship on board the ship with which it would often play in the most
diverting manner. From these circumstances, one might
be led to suppose that the disposition of the tiger, like that
of many other animals, was capable of some degree of
culture. But, as this author remarks, it ought to be remem-
bered, that at the time this one was taken on board the
ship it was only a month or six weeks old; and when arrived
in this country it had not quite completed a year. How
much longer its good humour might have continued it
is impossible to say; but it is not to be doubted that its inno-
cent playfulness would not have formed a part of its cha-
acter when arrived at maturity, at least there is every reason
to conclude this, when we recollect that most of those tigers
kept in our menageries have been made captives when very
young, and must necessarily acquire that ferocity of charac-
ter which so invariably distinguishes them from instinct only,
not from their habits or manners of life.

As the tiger attacks all animals, without exception, it has
not been frequently to foul the most arduous conflicts with
the rhinoceros, the elephant, and even the lion; and its
combat with either occasionally proves fatal to one or both
of the combatants.

It is affirmed of the tiger, that if it happens to mis its aim he does not pursue his prey, but, as if abashed of his
disappointment, runs off with speed. In the beginning of the
late century some ladies and gentlemen, being on a party
of pleasure under the shade of some trees near the banks of
a river in Bengal, observed a tiger preparing for its fatal
spring, when a lady, with almost unexampled presence of
mind, furled a large umbrella in the face of the animal, which
instantly retired, and thus gave an opportunity of escaping
from so terrible a neighbour. Another party had not, how-
ever, the same good fortune, but in the height of their en-
tertainment left, in an inn, one of their companions, who,
being seized and carried off by a tiger, was never heard of
more. Another disheartening accident, of a similar kind, took
place so lately as the year 1792, the particulars of which, as
related by an eye-witness, must be strong in the recollection
of many readers. The unfortunate victim of this event was
Mr. Munro, the son of Sir Hector Munro. "We went,"
says the writer of the narrative, "on shore at Sangar island
to shoot deer, of which we saw innumerable tracts, as well as
of tigers; notwithstanding which, we continued our diver-
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The feline, the tiger, infus the unfortunates, and rushed again into the jungle, dragging him through the thick-est bushes and trees, every thing giving way to his monstrous strength; a tigress accompanied his progress. The united agonies of horror, regret, and fear ruffled at once upon us. I fired on the tiger; he seemed agitated; my companion fired also, and, in a few minutes after this, our unfortunate friend came up to us bathed in blood. Every medical assistance was vain, and he expired in the space of twenty-four hours, having received such deep wounds from the teeth and claws of the animal as rendered his recovery hopeless. A large fire, consisting of ten or twelve whole trees, was blazing by us at the time this accident took place, and ten or more of the natives with us. The human mind can scarce form any idea of the scene of horror. We had hardly pulled our boat from that accursed shore, when the tigers made their appearance, almost raging mad, and remained on the sand all the while we continued in flight." A similar fate attended one of the servants in the retinue of Grandpré, a French traveller in India, a tiger, rushing on the party, seized him, and carried him off.

Marfden says, the number of people killed by the tigers in some parts of India is incredible. In Sumatra the natives are so infatuated that they seldom kill them, as they have a notion that they are animated by the souls of their ancestors; and from this weak and superstitious idea suffer themselves to be devoured without attempting by their united strength to destroy these rapacious creatures. In other parts of India, where the use of fire-arms is unknown, the devolutions committed by the tigers exceed all calculation; in the provinces of the mountainous and woody tracts of the Tenquain, for example, whole villages are depopulated by them. L'Abbe Richard speaks of a single tiger entering one of those villages and destroying four or five and twenty persons, there being no fire-arms to repel him, and the inhabitants endeavouring to escape death by flying in all directions, such as were pursued became an easy prey to the destructive monster. The woods of Sundy, and others adjacent to the banks of the Ganges, and its tributary rivers, are celebrated as the resort of tigers, and it is dangerous to navigate those waters close along the shore, the tigers having sometimes even the audacity to plunge into the water to attack the men in their boats.

Pliny has incurred the censure of some modern writers for describing the tiger as an animal of tremendous swiftness, "animal tremendæ velocitatis;" which they say is applicable to his spring when darting on his prey, and not to the swiftness of his pace when running. In this remark they are contradicted by two travellers of authority, namely, Per Gerbillon, and Mr. Bell, the first of whom speaks of it as an animal of vast swiftness, and the other fav a race between a tiger and a swift horse, whose rider escaped merely by rushing into the midst of a circle of armed men. One point does not, however, appear to have been considered; it is not unlikely that the animal spoken of by Pliny under this appellation may be the tiger of the moderns; yet, from the very light account he has left us, this is not certain: (vid. lib. viii. c. 18.) and if it be really the animal intended, there is still no cause to distrust its accuracy, for the tiger must be a creature of amazing speed. The accounts given by writers of the attachment shown by the tigresses to their young, the manner in which he defends them, or if carried away endeavour to regain them, and the fury of her conduct for their loss, is a repetition only of the observations made by Pliny, or with little variation. She is at all times furious, but when robbed of her young her rage rives to the utmost extremity. She then braves every danger, and pursues her plunderers, who are usually mounted on the swiftest horses, so closely, that they are often obliged to release one in order to retard her: this she endeavours to convey to some thicker or place of safety, and then again haunts after the hunters, who may be compelled to drop another of her cubs in the same manner in order to escape with the rest. The hunters on this arduous occasion are generally provided with boats on the nearest river, or the shore of the sea, to which they retreat with all speed, the tigresses pursuing them to the water's edge, and when her hope of recovering them is lost, he expresses her agony by the most hideous howlings.

The amours of these animals are farcious in the extreme: it has not hitherto been well ascertained how long the tigresses go with young, but it is commonly believed to be about the same period as the lion: they have about four or five young at each litter.

Among the Chinese the skin of the tiger is held in much higher esteem than it is by Europeans, and forms an article of drefs for persons of particular distinctions; and it befriends serves as a covering for the seats and cushions in the houses of the great, and in their halls of public justice. The Indians pretend that the fat of the tiger is an universal remedy for all external ailments. The tongue, dried and reduced to powder, is a specific for difeases of the nerves; their eyes have also some imaginary virtues, and probably many other parts of the animal are alike considered as sovereign remedies for different maladies of the human frame.

Hunting the tiger is a favourite diversion of the great in the eastern parts of the world, and is always conducted with much pomp and ceremony. When the monarch, princes, or nobles hunt the tiger, they are usually mounted on elephants; and their retinue, consisting of hunters and soldiers, attend, some on horseback and others on foot. Combats between the tiger and the lion, or the elephant, are also, on some grand occasions, the amusements of those eminences. They consider the tiger as a more powerful animal than the elephant, and therefore cover the head of the latter with a kind of shield previously to the engagement. Sometimes the tiger is matched against two elephants at once, instead of one, and even then the issue may be doubtful from the superior dexterity of the tiger. Tachard has given an account of a battle of this kind at Siam, of which he was an eyewitness. The heads, and part of the trunks of the two elephants, were defended from the claws of the tiger by a covering made for the purpose. They were placed in the midst of a large enclosure. One of them was suffocated to approach the tiger, which was confined by means of cords, and received two or three heavy blows from the trunk of the elephant upon its back, which beat it to the ground, where it lay for some time as if it were dead; but though this attack had greatly abated its fury, it was no sooner united, than, with a horrible roar, it made a spring towards the trunk of the elephant, but which that animal dexterously avoided by drawing it up, and, receiving the tiger on his back, threw him up into the air. The other elephant was then allowed to affilt, and after giving it several heavy blows, would undoubtedly have killed it, if an end had not been put to the combat. Under such restraints we cannot be surprized the result was unfavourable to the tiger. We can only be astonished at its strength andferceness, that after being disabled by the first attack of the elephant, and whilst yet held by its cords, it would venture to continue such an unequal conflict.

Tigers are destroyed by various means, besides that of hunting,
hunting, or combat; divers contrivances, machines, and toils having been invented by the more ingenious tribes of Indians for this purpose. One, the most simple and effectual, seems to be that of fastening an animal to a tree in the known track of the tiger, which they easily discover by the footsteps, and placing near the spot a yellocow filled with water lathered with armen'; the tiger, after devouring its victim, eagerly drinks the water to quench his thirst, and thus inevitably becomes poisoned and dies.


The difference between the panther and the leopard is so very trivial and ambiguous, that it has been long confiered doubtful among naturalists whethex they are in reality specifically distinct or not; and indeed it seems to be so nearly decided of late years that they are the same by the bolt writers, that we cannot entirely refuse our assent to this conclusion. The panther is the largest of these two animals, and in point of size ranks next to the tiger, measuring about five or six, and, in some instances, seven feet, from the nose to the origin of the tail, and the tail itself nearly three feet. The hair is short and smooth, and the general colour fine tawny yellow, thickly marked over the upper parts of the body, shoulders, and thighs, with roundish black spots, disposed into circles, consisting of four or five spots, with sometimes a single dot in the middle. On the face and legs the spots are single. The breast and belly are white, the former with dully transverse stripes, the latter, and also the tail, with large irregular spots of black. The head is moderate in length, the ears pointed, the eyes pale yellow, and its whole aspect fierce and cruel. The leopard is about four feet in length from the nose to the origin of the tail, and the latter about two feet long. The predominant colour is yellowish, of a paler hue than that of the panther, and more incising to luteous; the spots with which it is diversified are also black, and disposed in circles, but are smaller, closer, and kts distinct than in the panther, and the space in the centre of the rings, formed by the disposition of the marginal rings of spots, is usually plain. This is the general appearance of the two above-mentioned animals, but they vary in colour, and also in the size and form of the spots, and ocellated marks in different individuals. The supposed varieties of the panther and leopard, described by some travellers and other writers, cannot be mentioned with implicit confidence; such are the black leopard, and buffet leopard.

Both the panther and the leopard abode in the interior of Africa, from Barbary to the remotest parts of Guinea, and are the scourge of every country they inhabit. The panther, from its superior size and strength, attacks the larger quadrupeds, and is extremely destructive among the camels and horses; the leopard commits dreadful havoc among the herds and flocks of goats, sheep, and other animals, and the different kinds of game.

These animals frequent the banks of rivers, and take their prey by surprise, either lurking in thickets, from which they dart on them when they approach within a convenient distance, or creeping on the belly till they reach their victim; they climb trees in pursuit of monkeys and smaller animals with perfect ease; it is only when prefled with hunger that they attack man.

Travellers relate that the flesh of these animals is of excellent flavour, and white as veal. The Indians and Ne-
In the variety of its markings, as well as colours, the ocelot is extremely beautiful, the male especially. The general colour is bright tawny above, with the breast, belly, and lower part of the sides, together with the limbs, white. A black stripe extends from the top of the head, along the back, to the origin of the tail; the forehead is spotted with black, as are also the legs; the shoulders, back, and rump are finely variegated with ovate blotches and interrupted longitudinal bands of a deeper tinge than the ground colour, the edges of which are black; the spots are generally marked in the middle with a single spot of black, the stripes with a series of black dots disposed at nearly an equal distance from each other. The tail is diversified with blotches of an irregular form and black at the tip. In the female the fur is neither so vivid in colour, nor so beautiful in variety.

The ocelot inhabits the hotter parts of South America, where it inhabits mountainous situations, and refides chiefly among trees, like the lynx, or caracal; it lies in wait upon the boughs concealed among the leaves, and feizes its prey by darting on them from its lurking-place, when they approach within a convenient distance. Sometimes it perfurizes them by flirtagmen, extending itself along the boughs, where it can be seen as if it were dead, and springing on them when, from natural curiosity, they approach within its reach; monkeys are often caught by the ocelot in this manner. It is said to prefer the blood of animals to their flesh. Though voracious and fierce, it is of a timid nature, and so afraid of dogs that, when purified by them, it flies to the woods for safety. The inhabitants of South America call it chibagonaz.

The ocelot is not uncommon in Paraguay, though, from its manners of life, and the secrecy of its retreats, it is seldom seen; its visits to the poultry-yards in the farms contiguous to the woods are often ascertained by its foot-steps and the devastation committed. The ocelot never leaves its lurking-places in the day time, nor even in the night, when the moon shines; it is under the obliquity of the darkest nights, and when the weather is tempestuous, that it ventures so far as the neighbouring farms in quest of prey. Each of the retreats of the ocelot appears to be inhabited by a male and female, with their family of young; and though there may be many ocelots in the same woods their haunts are separate. They are said to have about two young ones at a litter.

Some years ago a male and female ocelot that had been taken very young were carried to France. At the age of three months they became so strong and fierce, as to kill a bitch that was given them to nurse. When a live cat was thrown to them they sucked its blood, but would not take the flesh. The male seemed to have a great superiority over the female, infirmity as never to allow her to partake of the food till his own appetite was satisfied. In a state of captivity the ocelot has been known to eat about five pounds of meat daily; three or four pounds are the ordinary allowance.


The margay is considered by some late continental writers as the tame animal with the ocelot, in a less advanced state of growth; but it appears to be more generally admitted as a variety of that species. It is a native of Guiana, Brazil, and various other parts of South America. In point of size it resembles the common wild cat. The ground colour is bright tawny; the face striped downwards with black; the body is marked with stripes and spots of black; the breast and under the legs white, with black spots; tail long, and marked with alternate spots of black, tawny and grey. Like the ocelot it lives in woody situations, chiefly residing in trees, and is said to breed in the hollows of them. It is of a fierce disposition, preys on birds, and produces two young at a birth.


This animal is about the size of a greyhound, the ideal length being about three feet and a half; the head is small, the body long, the ears short, and the tail about twenty inches. The body is of a light tawny brown above, marked with small round black spots, which are scattered over the back, sides, head, and legs; the belly is white, and the tail marked on the upper side with three large black spots. In several of the above particulars this animal agrees with others of the cat or tiger kind, but that by which it may be at once distinguished from every other of the same tribe is the mane on the collar and between the shoulder, a character no other animal of this genus is known to possess; the hairs which constitute the mane are about five inches long, and sufficiently copious to be distinguished.

The species of tiger, or leopard, which the Indians train for the purpose of hunting the antelope and other beasts of chase, has been described to vaguely, and under such different names, that we cannot speak precisely, but it is furnished the animal intended must be of this kind. The hunting tiger, according to the reports of travellers, is carried in a small kind of wagon, chained and hoodwinked, till it approaches the herd, when the animal is unchained and suffered to pursue the game. At first it creeps along with its belly close to the ground, stopping and concealing itself till it gets an advantageous situation; it then darts towards its prey with amazing agility, and, after five or six bounds, seizes it, and brings it to the ground. Should it not succeed in the first effort, it leaves no inclination to renew the attempt, but gives up the point and returns to its matter.


The puma, or cougar, is sometimes called the American lion. It is the largest of the beasts of prey known to inhabit the new continent, measuring in length rather more than five feet from the nose to the tail, and the tail itself measuring two feet eight inches. The form is slender, the body being long, and the animal standing high on his legs. The predominant colour is pale brownish red, inclining in some parts to blackish, especially on the back, which is darkened. Its chin is white; breast and belly tinged with ochre-colour, as are likewise the insides of the legs; the tail incloses to dusky ferruginous, with the tip black.

This is an animal of great strength and ferocity, preying on cattle and deer, to attack which it will swim rivers, and hurl through the bounds of inclosures. Sometimes it is said to climb trees, and watch the opportunity of springing on such animals as pass beneath. The species is common in Guiana, Brazil, and Mexico, and is found in various parts of North America, from Canada to Florida. Notwithstanding its ferocity, the cougar, when brought into captivity, is allowed to become almost as gentle as the common cat, allowing itself to be caressed, and Permitting boys to mount on its back. When satisfied with eating, it conceals the rest of its food; purrs like the cat, and sometimes...
times howls dreadfully. The flesh of this animal is white, and is eaten by the American Indians, who esteem it excellent food. The fur is soft, and forms an article of winter clothing amongst these people.

**FELIS.**


This inhabits the same parts of America as the former, and resembles it pretty nearly, except in colour, which is dusky, and in general plain. The throat, belly, and inside of the legs are pale ash; the upper lip white, and furnished with long whiskers, and the eye-brows beset with long hairs; at each corner of the mouth is a black spot; the ears are sharp-pointed, and the paws white. The tail is of the same colour with the rest of the body.

The black tiger is a cruel and ferocious creature, and greatly dreaded by the Indians, but is fortunately not common; it grows to the size of an ordinary cub, and is remarkable for its strength; its form, like that of the puma, is rather slender. M. De la Borde relates of the black tigers that they frequent the sea shore, and eat the eggs deposited there by the turtles. They also devour alligators, lizards, and fish, and sometimes the birds and tender leaves of the Indian fig. They are excellent hunters. In order to catch the alligator, according to this writer, they lie down on their belly at the edge of the river, strike the water to make a noise, and immediately that the alligator raises its head above the water, the tiger darts his claws into the eyes, and drags it on shore.

**CATUS.** Tail long and annulated. Gmel. *F. catus*. cauda elongata, auribus equitatis, Linn. Fu. Suec. 3. The wild cat (ferus) is distinguished from the varieties of the domestic cat by the superiority of its size, measuring four or even almost five feet in length from the muzzle to the end of the tail. It is comparatively more robust, and possesses of far greater strength and spirit. The head is larger, and the face flatter; the teeth and claws more formidable; and the colours and stripes in general nearly uniform. The fur is grey, mixed with yellowish, and sometimes slightly tinged with tawny. A dark line extends along the back, from the head to the origin of the tail, and the back, fides, and flanks traversed with a number of blackish lines, which originating in the longitudinal dorsal line, point downwards, in nearly a perpendicular direction towards the belly, like the aligator, according to this writer, they lie down on their belly at the edge of the river, strike the water to make a noise, and immediately that the alligator raises its head above the water, the tiger darts his claws into the eyes, and drags it on shore.

**The common domestic cat**, *catus domesticus* of the Linnean system, felis vel catus of Gennfer, and Felis domestic of Briflon and Jonson, derives its origin from the former, and is so infinitely varied in its appearance from culture and domestication, as to baffle all description. Schreber distinguishes the domestic kind from that existing in a state of wildness, by its smaller size, and the comparative tawnyfes as well as thickened of the hair. Among the principal varieties of the domestic cat, we may mention those entirely black, or black with white spots. White without spots or variation; white with black spots; white with brown spots. Dun or grey, plain or with little variation; or greyish, with darker stripes, which last approaches nearell in appearance to the parent flock. There are also many varieties spotted with white, black, and furrowed, occasioned by crossing the breed of the Spanish or tortoise-shell cat, which latter is supposed by naturalists to constitute a distinct breed, though not specifically different from our domestic cat.

We can add nothing to the general history of an animal so fully described as the present species, and whose manners of life are familiar to every reader. It is represented as an useful but deceitful domestic. Although when young it is playful and gay, it poisons the same time an innate malice and pervertive disposition, which increases as it advances to maturity, and which education instructs it to conceal, but not to subdue. Conflantly bent upon theft and rapine, though in a domestic state, they are full of cunning and dissimulation; they conceal all their designs, feize every opportunity of doing mischief, and then, Enabled of their misconduct, fly from punishment. Thus they assume, it is said, the habits of society, but never its manners; for they have only the appearance of friendship and attachment. Nothing can be more licentious, however, and oftentimes more unbounded, than general observations. We are too apt to deduce unlimited inferences from certain particulars, which may be arrived under peculiar circumstances, and thus establish the character of a whole race of animals from the most partial views. In some degree the reproach attached
tached to the character of the cat from its want of gratitude and attachment to its benefactors may be true, but barely not to the extent defiled; and we are to consider, also, that the treatment or the infliction this animal receives is not always of such a nature as to excite attachment. We believe chastisement, and expect fondness in return; we betray apathy, and require affection; or we desire gratitude for favours which are not worthy of that sentiment; and that without reflecting that the cat is of all others the most unrestrained of our domestics; one of those inmates which, even under our own roofs, leads a life of independence, and is cared for and admired only in proportion as the exhibits those proofs of ferocity towards the minor race of animals, which inspires her with the world passions of her race, a love of carnage, cruelty, and unrelenting vengeance; a propensity to destroy all creatures she has the strength and address to overcome. Thus early inured to habits of rapine, she becomes the tyrant of her inferiors, while to larger animals, and to man, the owns obedience, rather because she is capable of her own weaknesses, and looks up to them for protection, than from any tie of friendship or regard. The hand that mistreats he wants and supplies her food she may respect; few of the most ferocious beasts of prey are delusive of this attachment, and none reduced by culture to domestication. Thus scared and tutored, we instruct her to be rapacious when she can conquer; we teach her to be deceitful towards those she cannot overcome; and then accuse her of diffamation because the profits by our instruction. The ingenious Sonini, overlooking those propensities of the cat inherent in her nature, or imbibed from culture, is anxious to place this animal in its most amiable point of view; his reflections are just, but we are to remember that it is ferocity, at least to a certain extent, and not mildness, that befits the cat for that faction in society which it is defined to fulfill; and that those traits of character, which alone constitute its value as a domestic, at the same time that they cannot fail to render it rapacious and deceitful, ought surely not to have been forgotten in describing the disposition of this valuable animal. "The cats," says Sonini, in speaking of those found in Egypt, "are gentle and familiar; they have no enmity of man, the ferocious characteristics of other parts of France, render them a race of animals rather wild than domestic; but these differences are as much the work of man as the effect of climate. In the department where I live, and in those adjacent, the cat, especially in the country, is the most miserable of beings, next to the horses set apart for husbandry. Masters and servants agree in hunting the cat, in beating her, in pelting her with stones, in worrying her to death by dogs, after having almost harried her to death. If hungry, which her leanness clearly testifies, incites her to flee for the moment to steering a little morose, the pretended thief, because nature would not suffer her to let herself die of absolute want, pays with her life the address she has employed to support it. How is it possible that cats should not assume, under the discipline of such masters, whose cruelty to animals borders on barbarity, a wilfulness of physiognomy, an impetuous ferocity? And if you compare those wretched cats of my country with such as are entertained at Paris, where, more kindly treated and sheltered from perpetual alarm, they are of an amiable familiarity, you will have a new proof of the influence which the character of man exerts over that of the brute creation."

The cat brings forth twice or sometimes thrice in the course of the year. She goes with young about fifty-five or fifty-six days, and produces five or six young at each litter. The female exhibits every degree of maternal tenderness for her young, and often conceals them, left the male, as sometimes the cubs, should devour them; and, if apprehensive of being disturbed, she will remove them, one by one, in her mouth, to some other place of greater security.

Cats are in particular attached to the place where they were brought up, and if carried elsewhere seem lost and bewildered, and frequently take the first opportunity of escaping to their former haunts. These animals have been known to return to the place from whence they were carried, though at miles distant, and though they could not possibly have any knowledge of the road or situation that would lead to it.

This animal is about eighteen months before it acquires its full growth, and about ten years is the usual period of its life; some remarkable instances of longevity are, however, recorded, cats having lived to the age of twenty years, or more. It is generally remarked, that cats can live in the dark, which is not absolutely true, yet it is certain that they can live with much less light than most other animals, owing to the peculiar structure of the eye, the pupil of which is capable of being contracted or dilated in proportion to the degree of light by which they are affected. During the day the pupil of the eye is perpetually contracted; and he is with difficulty that he can see by a strong light, but, as in the twilight, the pupil resumes its natural roundness, the animal enjoys perfect vision, and takes advantage of this superiority to discover and surprise its prey. The cry of the cat is loud, piercing, and clarion-like; and, whether to preserve or of love, is equally violent and hideous. When pleased the cat purrs and moves its tail; when angry it spits, hisses, growls, and strikes with its feet, it is also said to emit a pungent smell at such times, and climb with great agility. In hunting and feigning its prey, the cat exhibits all the actions of the tiger, lying in wait, crawling on the belly, wagging the tail when preparing for its leap, and bounding on it when within a convenient distance. The cat is averse to water, cold, and unpleasing smells; it delights in certain perfumes, and is in particular partial to the aromatic emanations of the valerian, marjoram, and cat mint, as if not prevented, would inoffensively destroy the plants of this kind, growing in gardens, by rubbing itself against them, and trampling over them. Drunkin the spark, cats lick their feet, the latter of which it prefers, and fiddling the aroma very much. In hunger, it is proverbial, that the cat washes behind its ears before a fire; that when it falls from a height it alights on the feet, and that it is tenacious of life. The eyes have a somewhat phosphorescent or sparkling appearance in the dusk; and the hair being dry emits an electric fire which is visible in the dark: the fur is indeed said to yield the electric sparks so readily, that if, in frolly weather, a cat be placed on a flood with glass feet, and rubbed for a certain time, in contact with the wire of a coated phial, the latter will become electrically charged by that means.

In the days of Howel Dda, or Howel the Good, who reigned a short time before the Norman conquest, the domestic cat was valued at a considerable price, both on account of its scarcity and utility, and its life protected by law. The price of the kitten, before it could be sold, was to be a penny; till proof could be given of its having caught a mouse, two-pence, after which it was rated at four-pence, a great sum in those times: it was, however, required, that it should be a good mouset, have its claws whole, and, if a female, be a careful nurse; but if it failed in any one of these good qualities the seller was to forfeit a third part of its value. If any one should steal or kill the cat that guarded the prince's granary, he was either to forfeit a milch ewe, her fleece and lamb, or as much wheat as, when poured on the
The cat was held in high veneration by the ancient Egyptians. When a cat died in a house, the owner of the house, Herodotus informs us, flaved his eye-brrows; they carried the cats when dead into consecrated houses to be embalmed, and interred them at Bubastis, a considerable city of Lower Egypt. If any killed a cat, though by accident, he could not escape death. These laws were politically useful; it was necessary to put under the immediate protection of the laws a species of animals whose protection was indispensable against the prodigious multitudes of rats and mice with which Egypt was infested, and the most effectual means of procuring respect for them was to render them objects of deification. Cats, no longer regarded sacred in Egypt, are nevertheless to this day treated with the utmost care in that country, and are to be found in all the houses. The cats are trained in some of the Grecian islands to attack and destroy serpents, with which those islands abound.

The following are considered as permanent varieties, or distinct breeds, of the common cat species, felis cats. Angora cat. the hair of which is silvery-white, silky, and long, that surrounding the neck longest. This is the most beautiful of all the varieties; its nose and edges of the lips are fine rose colour; the eyes in general blue or yellow, blended of a sparkling brilliancy, and its white aspect mild and composed. The hair of a dazzling whiteness, remarkably thick and long, and the tail, when elevated above the body, forming a beautiful plume. Angora, the place celebrated for this race of cats, is in Asia Minor, not far from Smyrna; the beards manufactured with the hair of this animal is celebrated for its beauty and fineness throughout Asia.

Turkish-fell cat, Hissaricus, Gmel. Chat d'Ephesos, Buff. is black, varied with white and orange.

Blue cat, capreolus, Gmel. Chat des Chariteux, Buff. Blue kuzu, Kolbe. The hair of this is blue-grey. It was originally a native of Russia, from whence it has been diffused, and cultivated in various parts of Siberia.

Red cat, ruber, Gmel. Kotho kuzu, Kolbe. This is distinguished by having a streak of bright red running along the ridge of the back to the tail, and lying itself in the grey and white on the sides. It is found at the Cape, and the Ear is much valued from a singular idea the hunters entertain that it affords coffee in the coat.

Japan cat, Chat pouang Indien, Vosmaer. This is described as having the size of the common cat, and has a tail ten inches and a half long; the ears are upright and pointed; colour of the face and lower part of the neck whithish; breast and lower belly clear-grey, mixed with black, dipped in transverse streaks. Along the back is a broad band of black, which extends over the upper part of the tail; the lower part is not annulated with black and grey. Its cry is said to resemble the mewing of a great cat.

Ginara cat, Penn. Felis Ginaga, Molin. According to Molina this is a native of Chili, and is the size of the common cat. Its haunts are inaccessible forests. The colour is tawny, marked with round black spots, rather less than half an inch in diameter, and extending the whole length of the back close to the tail. The head in this and the following is rather larger in proportion than in the common cat. Cordobol-eat. Felis Cordobol, Molin. Like the former this inhabits forests, and preys on mice and birds. The colour is white, marked with irregular spots of black and yellow, and the tail encircled with black to the tip. Tail rather larger in proportion than in the common cat.

We cannot conclude this enumeration of the varieties of the common cat without observing, that it is extremely probable, when the three last mentioned animals become better understood, they may be found specifically distinct; whether also the variety said to occur in China, which has peculiar ears, and fur variegated with black and yellow, and the Madagascan cat with twisted tail, be of the same species with the common cat, seems rather undetermined. The felis manul of Gmelin appears, on the contrary, to be no other than a variety of the common cat.

Manul. Tail elongated, and annulated with black; head spotted with black, and marked with two lateral black bands. Pallass.

Inhabits the waftes of Tartary and northern Asia. Its size is that of the fox, but its form is more robust in proportion. The colour is tawny; the cheeks with two dusky lines running obliquely from the eyes; the feet are oblongely striped with dark lines; the tail longer than that of the domestic cat, thickly beset with hair, and encircled with ten distinct black rings, three of which nearest the tip are placed in contiguus as almost to touch each other. This is considered as a variety of the common wild cat, felis cats.

Capensis. Tail rather long, and annulated with black; body tawny, with stripes above, and spots beneath black; ears naked with a limited white spot. — Felis capensis, Gmel. Felis tigrina capensis, Forst. Act. Angl. v. 71. Cape tiger, Penn.

This animal appears to be of the same as that described by Labat under the name of 'Nuniful, and which he flates to be the size of a dog, with a coat as much striped and varied as that of a tiger. Its appearance he tells us bespeaks cruelty, and its eyes ferreeneat; but it is cowardly, and gets its prey only by cunning and insidious arts. When Dr. Forster touched the second time at the Cape of Good Hope, namely, in 1775, an animal of this species was offered to him for sale, but this he declined, because he was apprehensive, as one of the legs was broken, it would not live till they reached England. It was brought in a basket to his apartment, where it remained about twenty four hours, and this allowed him sufficient time to describe it with greater accuracy than had been previously done, and in some degree of observing its manners and economy. Thee he found to be perfectly analogous to those of our domestic cats. It ate fresh meat raw, and was very much attached to its feeders and benefactors; though it had broke the fore-leg by accident it was very easy. After it had been several times fed by Dr. Forster it followed him like the common cat. It was pleased when caressed, and, in token of its gratification, rubbed its head and back against the clothes of the person who fed it, and purred at the same time like the domestic cat. This animal had been taken when quite young, and was not above eight or nine months old when described, yet it had nearly, if not entirely, attained to its full size. Dr. Forster was told that the species lives in the mountainous and woody tracts; and that in their wild state they are highly delinquent to the hares, rabbits, jerboas, young antelopes, lambskins, and the whole of the feathered race. This animal is fully described in the 71st volume of the Philosophical Transactions.

Chaus. Tail moderate; annulated near the tip, which is black; body brownish yellow; ears brown on the outside, and bearded with black at the tip. Goldsith. Cebian lynx, Penn. Resembles the wild cat in manners, voice, and food. Its general length is about two feet six inches from the nose to the tail, though in some instances it has been known to measure three feet. The prevailing colour is yellowish brown.

The cat suspended by the tail (its head touching the floor), would form a heap high enough to cover the tip of the former.
brown, with the back and belly much brighter, or more aching to orange colour; the tail reaches only to the
flexure of the legs, and, besides the black tip, has three
obscure black bands at some distance from it; and on
the inside of the legs near the bend of the knee are two dusky bars; the tufts at the extremity of the ears are black.

The species was first described by Guldenstedt, in the
Transactions of the Royal Society of Petersburgh; it is found
in the woods and marly tracts on the borders of the
western side of the Cafpian sea, and in the Persian provinces
of Ghilan and Mafendoran, and is frequent about the mouth
of the Kus, the ancient Cyrus.

FELIS.

Serval. Tail rather short; body marked above
with roundish dusky spots; orbits of the eyes and belly white.


An animal much resembling the lynx in form, but
smaller, the ears are also destitute of that tuft of hair so
conspicuous at the tip in the lynx, and the tail, compara-
tively to the general size of the animal, rather smaller. The
specimen described by the French academicians measured
two feet and a half from the nose to the tail, and the latter
was eight inches long. The colour on the head, back, and
flanks are fawn colour, the throat, belly, and inside of the
legs white, and the whole surface is covered with small, but
very distinct spots of black, which are not disposed in rows
like the spots on the panther, but separate. As in the
lynx the head is large, the feet also are strong and thick,
and the eyes brilliant.

The serval inhabits the mountainous parts of India and
Thibet, where it resides chiefly among trees, from which it
rarely descends, but, feeding on birds, pursues them by
leaping among the branches, or from one tree to another.
In its disposition it is extremely fierce, but avoids mankind
unprovoked, when it darts furiously upon the offender,
and tears and bites in the same manner as the panther.
The provincial name of this animal among the natives of Malabar
is maraputa; the Portuguese established on that coast call
it serval.

Caracal. Tail rather short, and with the body reddish
brown; ears outwards black, tip black and bearded.

Siyah-guhf, Charleton. Lynx cauda vitalina, Klein.


The caracal, or Persian lynx, resembles the common lynx
in figure and aspect, and nearly corresponds in size. It
differs from that animal in not being spotted; its hair is
rougher, and its colour different; the tail longer, and of an
uniform colour with the tail of the body; its face is of a
more lengthened form, and its disposition more ferocious.
The species inhabits only the warmer climates, and is com-
mon in Persia, India, Barbary, and other parts of Asia
and Africa. In the Persian language it is called siyah-guhf,
and in the Turkish karash-kulak, both which signify the cat
with black ears. The caracal is said to follow the lion,
and to feed on the remains which that animal leaves of
its prey, and for this reason it is called among the Arabs the
lion’s guide. Its height is about that of the common fox,
but is stronger and more robust; and Dr. Charleton men-
tions one which killed a hound, and tore it instantly in
pieces, notwithstanding the vigorous defence of the latter.

This animal, though tamed with extreme difficulty, when
taken young, and reared with great caution, may be trained
for the chase. It is employed with success in the pursuit of
the smaller tribes of quadrupeds, but it is said, whenever it
meets with one that is superior to it in strength, that it loses
its courage and gives up the chase. Herons, cranes, peli-
cans, peacocks, and others of the larger kinds of birds, it
takes by surprise, and overcomes with singular address.
When it has seized its prey, it holds it fast in its mouth,
and lies upon it some time motionless.

There are several varieties of the caracal, according to
different authors. The caracal of Barbary, described by
Buffon on the authority of Mr. Bruce, has the ears red on
the outside instead of black; the tufts on the ears are black,
the tail white at the tip, annulated with four black rings,
and some black marks behind the legs. It is the animal
which Mr. Bruce names the hooved lynx, and is said prob-
ably specifically distinct. Another supposed variety inhab-
bits Bengal, and has the tail as long as the legs; and a
third the tail white, with four black rings at the extremity,
the first of the two last mentioned is perhaps a distinct
species.

Rufa. Tail rather short, beneath and at the tip white;
above banded with black; body tawny spotted with brown;
ears bearded at the tip. Schreber. Le lynx, Buff.

Twice the size of the common cat; its colours a bright
bay, obscurely marked with small dusky spots; the lips,
throat, and whole under side of the body and limbs white.
From beneath each eye three curved blackish stripes pass
down the cheeks, and the upper part of the inside of the
fore legs is marked with two black bars. The hair shorter
and smooother than that of the common lynx, and the species inhabits America.

Lynx. Tail obscurely annulated, and black at the tip;
head and body whitish-tawny spotted with black; ears bearded at the tip. Schreber. Pionum dolopes, Norden.
Lynx, Albr. Le lynx, Buff.

The lynx is about the size of the fox, or of a middling
dog. The colour varies, but is generally of a pale-grey,
with a very light reddish tinge; the back and whole of the
upper parts obscurely spotted with blackish or dusky; tail
white, with the tip and rings black. The throat, breast,
and belly are white; and the fur remarkably thick and soft.
The eyes are of a pale yellow colour, and its whole aspect
milder than that of the panther or once.

Writers describe several supposed varieties of this animal,
one of which is white with dark spots, another yellowish;
white above, and beneath white with dusky spots, and
a third corresponding with the latter, but marked with spots
still more distinct. The species is found throughout Europe and Asia, and inhabits such various
climates, that we are not to be astonished that such varieties
should exist. The true lynx is found in the great forests in
the north of Germany, in Lithuania, Muscovy, Siberia,
and the northern parts of the old continent; but it admits
of considerable doubt whether it inhabits southern Asia.
The lynx of the Levant, Barbary, Arabia, and other hot
countries, is certainly the caracal, and the fur of this is
known by being delitute of spots.

In the museum of natural history in Paris, is a preferred
specimen of an animal called "Le lynx du Canada," a sup-
posed variety of the common lynx; its length from two feet
two inches from the rote to the extremity of the body,
and its height two or thirteen inches. The hair is long,
greyish mixed with white hairs, and is spotted like the
European lynx, but differs in the length of the tail, and
the tuft of hair on the ears being smaller. There is another
lynx in Mississippi, which has the tuft at the extremity of
the ears smaller than that last mentioned; the tail more
black, and the hair clearer in colour. In those northern
climates however, where the extremities of the seasons are
to severely experienced, it is to be considered that the fur of
animals vary in colour according to the season. Thus the
winter fur is exceedingly different from those of summer.

FELIS.
in all the animals that inhabit the north of America, or Europe. The fur of the American lynxes is most beautiful in winter, and bears a higher price than those of summer, and it is not only on account of their beauty these are preferred, they are more valuable for their felt and warmth. The same may be observed of northern Europe and Asia. The farther they are taken to the northward the whiter is the fur, and the spots more distinct. The most elegant of these are called irbis, and is taken near the lake Balskaf in Ulosc Tartary. It is larger than the European lynx, measuring five feet from the nose to the tip of the tail, of which the tail measures about six inches. The skin sells in that country for about twenty shillings sterling. Vast numbers of these skins are exported annually to China and Europe.

The lynx is a very destructive animal. It feeds on weasels, ermines, squirrels, and other small quadrupeds, which it pursues to the tops of the highest trees. The lynx also watches the approach of larger animals, as the hare and even the deer, and dart upon them from the branches of trees where it lies concealed, seizes them by the throat, and sucks their blood; after which it abandons them and goes in quest of other game. It often eats no more of the sheep or the goat than the brain, the liver, and the intestines. The sight of this animal is remarkably quick, which enables it to discern its prey at a great distance, and it is so artful, that it will sometimes dig under the doors to gain admission into the sheep-fold. When attacked it throws itself on its back, and strikes desperately with its claws. The hound of the lynx is not unlike that of the wolf, and it frequently expresses its malignity by a kind of snarling scream. From the ferocity of its nature the lynx cannot be tamed.

The poetical fictions of the ancients respecting this animal are not unknown; they feigned that the chariot of Bacchus was drawn by lynxes; that its sight was so penetrating that it could see through the most opaque bodies, and that its urine was converted into precious stone. Pliny confounds the lynx with the one, and speaks of it as a native of Ethiopia; the same writer, however, in another part, seems to have known the true lynx of the moderns, and informs us, the first lynx that was seen at Rome was brought from Gaul, which country might at that time produce this animal, as the Alps and Pyrenees were known to have done at a later period.

**FELIX I.** *In Biography,* pope, and a saint in the Roman calendar, was born at Rome, and succeeded in the pontificate in the year 259. Little more is known of this pontiff than that he reigned, and in his time a persecution was commenced by Aurelian against the Chalilhians, to which it has been supposed, that Felix fell a sacrifice, after he had filled the papal chair between five and six years. In the third volume of the *Collectio Conciliorum* is a fragment of a letter which this pope wrote to Maximus, bishop of Alexandria, against the tenets of Sabellius and Paul of Samosata, and which was read in the councils of Chalcedon and Ephesus. Moreri.

The second lynx, though by some writers denominated anti-pope, was a native of Rome, and archdeacon of that church when pope Liberius was banished by the emperor Constantine in the year 355. At this time the emperor and the Arian party were determined to place in the Roman see a person more favourable to the measures which they had adopted against Athanasius than Liberius, who had refused to sign his condemnation; they fixed on Felix for that station. This excited much disquiet, which kindled into insurrection; and the emperor recalled Liberius on the condition that he should jointly, with Felix, preside over the see. The people were still indignant, and joined in general acclamation, “There is but one God, one Christ, one bishop;” and as soon as Liberius returned, they drove Felix out of the city with every mark of detestation. Upon being expelled from the city, to which the emperor was in sequel contented, he withdrew to a small estate, which he had on the road to Porto, and there spent the remainder of his life in retirement. He died in 365. Many centuries after his death it was a subject of warm and even fierce contention, whether he was to be considered as a pope or not; and, in 1582, it was determined by pope Gregory XIII. that the canons of this pope should be solemnly tried, when, with the aid of a well concerted miracle, it was agreed that his title was valid. Moreri.

**FELIX III.** pope, was son of a presbyter at Rome, and is thought to be the great grandfather of pope Gregory, another of the Great. He was consecrated to the papal throne in the year 483, when he was chosen successor to Simplicius, by the unanimous vote of the people, clergy, and senate. He had not been long called to this high office before he found an opportunity, of which he was very desirous, of attempting to extend the influence of the Roman see over the eastern churches. Legates were accordingly dispatched for this purpose, who carried letters to Zeno the emperor, and Aecacius the patriarch of Constantinople, conjuring them, as they valued the salvation of their souls, not to suffer a heretic to sit in the see of St. Mark. They had orders also to cite the patriarch to appear in person, or by proxy to justify his conduct in an assembly of bishops before St. Peter. With these instructions they set out for Constantinople; but when they had arrived at Abyssus on the Hellepsont, they were arrested by order of the emperor, and thrown into prison, where they were hardly treated and threatened with death, as disturbers of the public peace. They were at length suffered to depart, bringing back letters from the emperor and Aecacius to the pope in justification of their conduct. Felix immediately assembled a council of Italian bishops, by whom the legates were declared to have behaved in a manner highly prejudicial to the Catholic canons in the East, and to be unworthy of the episcopal dignity. Felix next engaged the council to undertake the trial and condemnation of Aecacius. The pope, on this occasion, assumed an authority, when promulgating the sentence pronounced against him, for which, it is said, there is no precedent in church history. That sentence the pope transmitted to the emperor and clergy, enjoining them to submit to the sacred laws of the church, and adding, that they must renounce Peter Mongus, the heretic before referred to, who had been contented with Aecacius in opposition to Talla, the deposed patriarch of Alexandria, or that of the apostle Peter. The same sentence was conveyed to Aecacius, who treated the pope and his anathemas with the utmost contempt, and in turn anathematized him, cutting him off from his communion, and ordering his name to be struck out of the sacred diplomas. This conduct of Aecacius was approved by the emperor, the church of Constantinople, and by almost all the other bishops, who united in a separation from the communion of the pope. Such was the origin of the first schism between the Greek and Latin churches. In the year 487 Felix convened a synod at Rome, to discuss the question respecting the reconciliation of those to the Catholic church, who had been baptized or re-baptized by the Arians during the Vandal perfecution in Africa. About the year 488 Fravita succeeded Aecacius as patriarch of Constantinople, when measures were immediately taken to bring about a reconciliation between the
eastern and western churches, which Felix rejected, unless the name of Acacius was first struck out of the faced diptychs. The same inexorable temper proved an obstacle to the defined union during the patriarchate of Eusebius, the successor of Zeno in 491.

Felix wrote to Amphilochus his predecessor, congratulating him on his accession to the throne, intimating an intention, that under his authority the interests of the true faith would be respected and promoted. The emperor paid no attention to this letter, and Felix died before he could have any opportunity of witnessing its result at the neglect of the exhortation. He was, as our account will show, an enterprising, ambitious, and arrogant man, more devoted to the extension of the papal power than the true welfare of the church. In the 4th volume of the "Collectio Conciliorum" are fifteen letters ascribed to him, and Dupin has taken pains to distinguish between the genuine and spurious. Moreri. Moaisheim.

Felix IV. pope, a native of Beneventum, was raised to the papal see on the death of John, in the year 526. He was appointed to this high dignity by king Theodosius, who, when the senate and people were divided in their support of rival candidates, thought proper to interfere in the matter, and fix upon a person of a most exemplary life, and every way worthy of the pontifical dignity, but whom the contending parties had overlooked. The people at first opposed his authority, but submitted when the king agreed that in future they should be allowed to choose whom they pleased, subject to his confirmation. After this Felix was ordained to his office, and proceeded over the Roman see about four years. He died in 530. Three letters in the 4th volume of the "Collectio Conciliorum" have been attributed to him, but the first two are not regarded as genuine. Moreri. Moreri.

Felix V. See Amadeus VIII. and Eugenius IV.

Felix, bishop of Urgell, in Catalonia, in the eighth century. See Lipand.

Felix, St. In Geography, a small island in the Pacific ocean, N.N.W. of Juan Fernandez, not far from the coast of Chili. S. lat. 26° 10'. W. long. 85° 40'.—Also, a town of France, in the department of the Upper Garonne, and chief town of a canton in the district of Villefranche; 22 miles E.S.E. of Toulouse. The place contains 3,388, and the canton 11,458 inhabitants, on a territory of 187,560, and in 13 communes. Also, a town of France, in the department of the Arieon; six miles S.E. of St. Africque.

Felix, Cape, a cape on the west coast of the island of Sumatra. N. lat. 4°. E. long. 96°.

FELIZAN, a town of France, in the department of Marengo; 12 miles E. of Affi.

FELIZES DE GALLEGO, St. a town of Spain, in the province of Leon; eight miles N.N.W. of Ciudad Rodrigo.

FELL, John, in Biography, son of Dr. Samuel Fell, dean of Chirch-Church, Oxford, was born in the year 1625. He received his grammar learning at Thame, in Oxfordshire, and from thence was admitted a student at Chirch-Church college in 1636, when he was but eleven years of age. In 1640 and 1643 he took his degrees of B.A. and M.A., and about the latter period he bore arms for king Charles I. within the garrison of Oxford, and obtained the rank of ensign. In 1648 he was ejected from his student’s place by the parliamentarian victors, from which time, till the restoration of Charles II., he lived in retirement at Oxford, joining many royalists in privately using the liturgy and rites of the church of England at Merton college. After the

restoration he was appointed prebendary of Chichester; canon, and then dean of Chirch-Church in 1650, when he was created doctor in divinity; and appointed one of his majesty’s chaplains in ordinary. He was, in every respect, a great benefactor to Chirch-Church college, of which he was the head. He applied himself to the restoration of its discipline, and to the promotion of learning and religion among its members; and by his own benefactions, together with what he procured from others, he made many important additions to the buildings of the college. From the year 1656 to 1659 he filled the office of vice-chancellor of the university with the highest reputation. In 1675 he was promoted to the bishopric of Oxford, with leave to hold his deanery, in order that his college and the university might still enjoy the benefit of his services. To the former he continued through life a liberal benefactor, and at his death left an estate for the support of ten exhibitioners. As one powerful means of promoting literature, he paid great attention to the improvement of the university pres, and became himself editor of numerous ancient and modern writers. From the time of his becoming dean of Chirch-Church to his death, he annually published a book, generally a classical author, with a preface, notes, and corrections, which he presented as a new-year’s gift to the students of his house. He was a liberal benefactor likewise to the poor and afflicted. When he had filled the see of Oxford ten years his health began to sink under his exertions, and the anxiety which he felt on account of the changes attempted to be brought about in religion by king James II. He died in 1686, leaving behind him the general character of a learned and pious divine, of an excellent classical scholar, of a great affector of the church of England, of another founder of his own college, and of a patron of the whole university. When the Royal Society was instituted, Dr. Fell was among the almonists at the innovation upon the Aristotelian system, and encouraged Stubbe to write several pieces against the members, charging them with intentions to bring contempt upon ancient and solid learning, to undermine the university, and even to destroy the established religion and introduce popery. Dr. Fell was author of the life of Dr. Henry Hammond; he published some other original pieces. He translated, with the assistance of persons employed by himself, "Historia et Antiquitates Universitatis Oxoniensium." See in two volumes, folio. In his translation he omitted some things which Anthony Wood, the author, requested the public not to impute to him. He published an edition of the Greek Testament, and was author and editor of a great many other works, for an account of which, see Biog. Brit.

FELL, JOHN, a Protestant dissenting minister, was born at Cockermouth, in Cumberland, in the year 1732. and rofe, by his talents and application, from a humble station and mechanical employment, to considerable reputation as a scholar and a divine. He furnished his education for the ministry at the academy at Mile-end, in the vicinity of London; and was much aided and encouraged by Dr. Walker, one of his tutors, who took pleasure in promoting the literary attainments of those who were committed to his care. Mr. Fell was one of his favourite pupils, and in the progress of his years appeared to have acquired himself in a very high degree of the advantages which he had enjoyed under the instruction of his tutor. His first settlement, as a pastor, was at Thaxted in Essex, where he formed a connection with a congregation of the independent denomination in the year 1752, and where he continued for several years; uniting with his pastoral duties the superintendence of a respectable boarding-school. As a schola-
a school-master and a preacher he was highly esteemed and respected. When a vacancy of rectorial and classical tutor occurred in the academy where he had received his education, then removed from Mile-end to Homerton, he was earnestly urged to accept this office; which, on account of several unpleasant circumstances that attended it, arising partly from domestic discord, and partly from the unkindness and illiberality of some of the friends of the institution, proved in the event the occasion of great uneasiness, and served, indeed, to embitter and to accelerate the termination of his life. Although he was discharged from his office by a vote of the majority of his constituents, he was patronized after his dismissal by a very respectable minority, who devised plans for his future subsistence and comfort. With this view they engaged him to deliver twelve lectures on the evidences of Christianity, for which the sum of 200l. was contributed; and an active friend opened for him a subscription which was sufficient for purchasing an annuity of 100l. His constitution, however, was broken down by the treatment he had suffered; and the irritation of his mind was increased by his anxiety for duly discharging the service he had undertaken, and thus requiring the generosity of his friends; so that he did not long live to enjoy the provision which had been made for him. Four of the proposed lectures were delivered in the four first months of the year 1797 to crowded auditories; but a complicated disorder, under which he languished for four months, prevented his prosecution of them, and terminated his life on the 6th of September in this year, in the 65th year of his age. The course of lectures was completed by Dr. Hunter, and the whole series formed a volume, which was published after the death of Mr. Fell. The theological sentiments of Mr. Fell were such as are usually denominated Calvinistic; but he combined with his sincerity attachment to them a great degree of charity and candour towards those who differed from him. We knew him well; and though his temper was somewhat irritable, he was a pleasing and instructive companion. His memory was retentive; his reading various; and his knowledge extensive. To the interests of civil and religious liberty he was ardently devoted; and of these interests he was an able advocate. Under the article Farmer we have mentioned some of his most elaborate publications. Besides these, he was also the author of the following works: viz. "An Essay on the love of one's Country," 8vo. "Genuine Protestantism, or the unalienable rights of conscience defended," 1773, and 1774, 8vo. "The Justice and Utility of Penal Laws for the direction of Conscience examined," 1774, 8vo. "Remarks on the Appendix of the Editor of Rowley's Poems, &c." 1783, 8vo. "An Essay towards an English Grammar, with a Difertation on the natural and peculiar Ufe of certain Hypothetical Verbs in the English Language," 1784, 12mo. &c. Gen. Blog.

Fell, in Rural Economy, a term sometimes employed to denote the skin or hide of an animal. Fell, a term applied to the knocking down of animals which are to be killed. The axe is mostly employed in this business, but should be discontinued, and that of trefing be made use of in its place. Fell, in Mining, signifies small pieces of lead ore, and spars, which have paffed through a riddle with openings about an inch square. Fell-fleet signifies large pieces of foliage, or feagly, that is, refuse spar.

Fella, in Geography, a river of Carinthia, which runs into the Drave, near Machling. Fella, Cape, a cape on the west coast of Calabria. N. lat. 39° 38'. E. long. 16° 24'.

FELLENBERG, a town of the Tyrolese; four miles W.S.W. of Innsbruck.

FELLETIN, a town of France, in the department of the Creufe, and chief place of a canton in the district of Aubinie; 21 miles S.S.E. of Gueret. N. lat. 45° 53'. E. long. 2° 15'. The place contains 1266, and the canton 10,713 inhabitants, on a territory of 2073 kilometres, and in 10 communes. The chief article of trade is cattle, and near it is a medicinal forage.

FELLIN, a town of Naples, in the Lavora; 13 miles E.N.E. of Naples.

FELLING, a town of Austria; 10 miles W.N.W. of Crums.—Allo, a town of Austria; 11 miles S. of Vienna.

Felling of Timber, in Rural Economy, the operation of cutting down trees for the purpose of timber. In the performing of this sort of business attention should in the first place be paid to the season of the year, especially where the timber is of the oak kind or such as is to be peeled for the bark, as it will only peel, or, what the workmen term run, at a particular period, which is generally in the spring months, just before the leaves expand. With many other sorts of timber trees this is not, however, necessary to be regarded; but they should, in general, be cut down previously to the leaves appearing.

It is the practice of some, where any sort of tree is to be cut down in the above intention, first to take off any branches that may be likely to injure it in its fall, much harm being frequently done to trees for want of care in this respect. Where the branches or limbs are of considerable size, they should be cut on both sides, close to the bole, in order to prevent their splitting. In cases where the trees are not grubbed up, they should be cut as close to the roots as possible, by which there will be a fusing of the most valuable part of the timber.

In the work of felling there is considerable art to make them fall in the best way, which is only known by those woodmen who have had much experience. Where a large fall is therefore to be made, it is of much advantage to have men of this kind to undertake the business. The price of felling is regulated by a variety of different circumstances, as the kind of wood, the size of the trees, the nature of the situation, &c.; but the work is often done by the tree, or at a fixed price for a certain number of trees. See Woods and Timber.

FELLINGSBRO, in Geography, a town of Sweden, in Uppland; 44 miles W. of Stockholm.

FELLIS, a mountain of Africa, in Aedil; 50 miles W. of Cape Guardafui.

FELLOWS, or Fellies, in Artillery, are six pieces of wood, each of which forms an arch of a circle, and these, joined all together by gudgeons, make an entire circle, which, with a nave, and twelve spokes, form the wheel of a cannon-carriage. Their thicknes is usually the diameter of the ball of the gun they serve for, and their breadth something more. Their dimensions are as follow; for a 24 pounder, five inches thick, and 64 inches broad; for a 32 pounder, 4½ inches thick, and six inches broad; for a 40 pounder, four inches thick, and 5½ broad, &c. made of dry elm.

FELLOWSHIP, Company, or Partnership, in Arith- metic, is a rule of great use in balancing accounts amongst merchants and owners of ships; where a number of persons putting together a general flock, it is required to give every one his proportional share of ships or gain.

The golden rule, several times repeated, is the basis of fellowship, and fully answers all questions of that kind; for, as the whole flock is to the total thereby gained or lost, so
each man's particular flock is to his proper share of lods or gain. Wherefore, the several sums of money of every partner are to be gathered into one fund for the first term; the common gain or lods for the second; and every man's particular share for the third; and the golden rule is then to be wrought so many times as there are partners.

There are two cafes of this rule, the one without, the other with time.

FELLOWSHIP without time, is where the quantity of flock contributed by each person is alone considered, without any particular regard to the length of time that any of their monies were employed. An example will make this process easy.

A.B. and C. freight a ship with 212 tons of wine; A. laying out 1342l. B. 1178l. and C. 630l. towards the same; the whole cargo is sold at 32l. per ton. Query, what shall each person receive?

Find the whole produce of the wine by multiplying 212 by 32, which yields 6784. Then, adding together the several flocks, 1342, 1178, and 635, which make 3150, the work will stand thus:

\[
\begin{align*}
3150 & : 6784 \\
\text{Answ.} & = 2890, 1993, & \text{c.} \\
650 & : 13658
\end{align*}
\]

Proof 3150 6784

FELLOWSHIP with time, usually called the Double rule of Fellowship, is where the time during which the money, &c. were employed, enters into the account. An example will make it clear.

A. B. C. commence a partnership the first of January, for a whole year, A. the same day disbursed 100l. of which he received back again, on the first of April, 22l.; B. pays, on the first of March, 60l. and more, the first of August, 100l. C. pays, the first of July, 140l. and the first of October, withdraws 40l. At the year's end their clear gain is 142l.

Query, what is each person's due?

A.'s 100l. multiplied by three months, the time it was in, makes 300l. and the remaining 80, by nine months, 720, in all 1020l. of A.'s contribution. For B. 60 into 10, gives 600; and 100 into 5, 500; in all 1100l. for B. For C. 140 into 3, gives 420; and 100 into 3, is 300; in all 720l. for C. Now, 1020 + 1100 + 720 = 2840 for the common antecedent, and the gain 142, is for the general consequent; the rule will stand thus:

\[
\begin{align*}
2840 & : 142 \\
1100 & : 55 \\
720 & : 36
\end{align*}
\]

Proof 2840 142

N.B. All the particular times (if not so given) must be reduced into one denomination, viz. into years, months, weeks, or days.

FELLY, in Agriculture, is a term which is sometimes properly applied to the breaking up of a fallow. It is likewise the name of a part of a wheel.

FELNA, in Geography, a district of Russia, in the government of Smolensko, situated on the Dfina.

FELLO, Cape, the S. W. point of Sicily, N. lat. 37° 46'.

FELLO de fe, in Law, is he that commits felony, by willingly and deliberately killing himself; or doing any unlawful malicious act, the consequence of which is his own death; as if, attempting to kill another, he runs upon his antagonist's sword; or, shotting at another, the gun burts and kills himself. (1 Hawk, P. C. 68. 1 Hal. P. C. 413.) The Saxons call him self-dee. He must be of the age of discretion, and compe mentis. But if a real lunatic kills himself in such an interval, he is a felo de fe as much as another man. (1 Hal. P. C. 412.)

A felo de fe is to be interred without Christian burial, with a flake driven through his corpse; and into this the goods and chattels, real and personal, but he may make a devise of his lands, because they are not subjected to any forfeiture. (Plowd. 264.) However, these forfeitures are generally favored by the verdict of the coroner's jury, who find lunacy. See Suicide.

If a person felo de fe is secretly made away with, so that the coroner cannot view his body, prententment is to be made of it by justices of peace, &c. in order to entitle the king to the forfeiture of goods.

FELON, in Surgery. See WHILLOW.

FELON usw. See SOLANUM.

FELONIOUS HOMICIDE. See Homicide.

FELONY, Felonia, was anciently used for a violent and injurious action of a vaflal, or tenant, against his lord.

Medage derives the word from felonia, formed of felo, or fello, which occurs in the capitulars of Charles the Bald, and is explained to come from the German feldon, or Saxo folen, to fail, or be dillivered. Others derive it from the barbarous Latin solanio. Lord Coke, Niced, &c. derive it a sol, gall, as being supposed to be done maliciously. Others derive it from the Greek solas, to deceive. But the learned Spelman, with greater probability, deduces it from two northern words, viz. see, which signifies seis, fud, or beneficiary estate, and los, which signifies price, or value; so that felony is the same as pretium fudis, the consideration for which a man gives up his life; agreeable to the common expression, such an act is as much as your life, or estate, is worth.

In this sense felony was equivalent to petty-treason, or it was a crime next below high treason. The crime of felony imported confiscation of the fee, to the profit of the lord.

All those acts, whether of a criminal nature or not, which at this day are generally forfeitures of copy-hold estates, are styled felonia in the feudal law.

FELONY was also applied to an injury to the lord in his vassal, which imported a forfeiture of the homage and service thereof, and made it revert to the sovereign.

Fidelity and felony are reciprocal between the lord and the vassal.

FELONY, in the general acceptation of law, comprises every species of crime, which occasioned, at common law, the forfeiture of lands or goods. This most frequently happens in those crimes for which a capital punishment either is or liable to be inflicted; for these felonies which are called clerical, or to which the benefit of clergy extends, were anciently punished with death in lay or unlearned offenders, though now by the statute-law that punishment is, for the first offence, universally remitted. (See BENEFIT of Clergy.) Treson itself (says Coke, 3 Inst. 15.) was anciently comprised under the name of felony. And not only all offences now capital are in some degree or other felony; but this is likewise the case with some other offences, which are not punished with death; as Female, where the party is already dead, homicide by chance medley; or in self-defence; and petty larceny or pilfering; all which are, strictly speaking, felonies, as they subject those who commit them to forfeitures. So that upon the whole, the only adequate definition of felony seems to be this, viz. an offence which occasions a total forfeiture of either lands or goods.
F. E. I.

goods, or both, at the common law; and to which capital or other punishments may be superadded, according to the degree of guilt." (Blackf. Com. vol. iv.) The idea of felony is so generally connected with that of capital punishment, that it seems hard to separate them; and to this usage the interpretations of law now conform. For if a statute makes any new offence felony, the law implies that it shall be punished with death (viz. by hanging), as well as by forfeiture, unless the offender prays the benefit of clergy. (Hawk. P. C. c. 41. ii. c. 18.) So where a statute decrees an offender to undergo judgment of life and member, the offence becomes a felony, though that precise word be omitted; but the words of the statute must not in such case be the least doubtful or ambiguous. (1 Hawk. P. C. c. 41.)

Felony is also used, in Common Law, for any capital offence, perpetrated with any evil intention.

Though capital punishment does by no means enter into the true idea and definition of felony, the true criterion of which is forfeiture; for in all felonies which are punishable with death the offender loses all his lands in fee-simple, and also all his goods and chattels; but in such as are not so punishable, his goods and chattels only. 1 H. 117.

In a stricter sense, felony denotes all capital crimes below treason.

Felony includes several species of crimes, such as petit-trespass, murder, theft, homicide, felony, rape, willful burning of houses, receiving of stolen goods, &c.; breach of prison, refuge and escape, after one is arrested or imprisoned for felony, and divers others found in the statutes, which are daily making crimes felony, that were not so before.

Felony by the common law is against the life of a man, as murder, manslaughter, felo de fe, se defendendo, &c. against a man's goods, such as larceny and robbery; against his habitation, as arson and burglary; and against public justice, as breach of prifon. 3 H. 41.

Piracy, robbery, and murder upon the seas, are felonies punishable by the civil law, and also by statute. 1 H. 117.

Felony is easily distinguished from treason.

From lesser crimes it is distinguished by this, that its punishment is death, though not universally; for petty larceny, i. e. stealing of a thing under the value of twelve pence, is felony, according to Brook, though the crime be not capital, but only a sort of goods. The reason Brook gives for its being felony is, that the indigent rums, felon
ciae civit.

Till the reign of Henry I. felonies were punished by pecuniary fines; that prince first ordered felons to be hanged about the year 1108.

Felony is of two kinds; the one lighter, which for the first time is entitled to the benefit of clergy; as man-slaught

The other, more heinous, is not allowed the privilège.

Felony is also punishable by lots of all lands, not intailed; and all goods and chattels, both real and personal; though the statutes make a difference in some cases concerning lands, as appears by Stat. 37 Hen. VIII.

Felony ordinarily works corruption of blood, unless the statute, ordaining the offence to be felony, provide otherwise; as the Stat. 39 Eliz. cap. 17.

The punishment of a person for felony by our ancient books is to lose his life; to lose his blood, as to his ancestry, so as to have neither heir nor posterity; to lose his goods; and to lose his lands. (4 Rep. 121.) A felony by statute incidentally implies, that the offender shall be subject to the like attaund and forfeiture, &c. as is incident to a felon at common law. (3 H. 47. 59, 92.)

Private persons may arrest felons by their own authority, or by warrant from a justice of peace; and every private person is bound to affix an officer in taking felons. But one ought not to be arrested upon suspicion of felony, except there be probable cause sworn for the ground of the suspicion. (1 H. 4. 65.) A private man cannot justify breaking doors to take the person suspected; but he does this at his peril. Whereas officers may break open a house to take a felon, or any person justly suspected of felony; and if an officer hath a warrant to take a felon, who is killed in retaking, it is not felony in the officer; but if the officer is killed, it is otherwise. 3 D. 289.

Perfons indicted of felony, &c. where there are strong presumptions and circumstances of guilt, are not repelevable; but for larceny, &c. when perfons are committed, who are of good reputation, they may be bailed.

If a person be committed to prifon for one felony, the justices of gaol delivery may try him for another felony, for which he was not committed, by virtue of their commission. (1 H. 62.)

It is not very easy to re-capitulate the vast variety of offences that are made felony by innumerable statutes, which the security of society has required. We must refer for particulars to the appropriate articles as they occur.

Felony, Appeal of. See Appeal.

Felony, Compounding of. See Theft-Bote.

Felony, Discovery of. See Discoveries.

Misprisision of. See Misprison.

FELOOPS, in Geography, a people of Africa, who inhabit a considerable tract of country between the Gambia and the Rio Grande.

FELROE, a river of Africa, which runs into the Senegal, 60 miles above Galen.

FELSBERG, a town of Hesse-Cassel, with an ancient castle on a rock; 12 miles S. of Cassel.

FELSTIN, a town of Anllrian Poland, in Galicia; 40 miles S. W. of Lemberg.

FELSITE. See FELSAR.

FELSAR, Feldspar, Germ. Of this mineral there are the following sub-species: adularia, common felsar, compact felspar, continuous felspar, Labrador felspar.

1. Adularia. Montflours, Kirw. The colour of adularia is yellowish, greenish, or milk-white, and in certain directions it exhibits a display of fancy and pearly colours, owing to the different reflections of light from the laminae of which it is composed. It occurs either in masses or crystallized. Its primitive figure is an irregular oblique-angled parallelopiped, of which the faces are smooth and well defined, and form an angle with each other of 90°; while the faces in the third direction are uneven, and form with the other angles of 120° and 111° 28'. It also presents the following modifications: 1. An oblique four-sided prism, bevelled on two of its opposite sides. 2. An oblique four-sided prism with dished summit. 3. A six-sided prism with dished summit. 4. A double crystal in the form of a rectangular four-sided prism, composed of two half crystals united together in opposite directions. 5. A quadruple crystal, composed of four crystals of var. 2. united together by their summits, and mutually penetrating each other, forming a cross consisting of four triangles united round a common centre.

The surface of the crystals is smooth, and often flirtated longitudinally. They are for the most part middle-sized or large. The external lustrous is shining and somewhat pearly; the
FELSpar.

The lustre of the principal fracture is bright-fibrous, that of the cross fracture is thinning, between vitreous and pearly. Its longitudinal fracture is perfectly foliated; its cross fracture is small conchoideal. It breaks into rhomboidal fragments. It is sometimes composed of straight lamellar distinct concretions. It is translucent, passing to transparent. Its hardness is inferior to that of quartz, but greater than that of common felspar. It is easily flaking; fr. gr. = 2.5 to 2.6. It has been analyzed by Vauquelin, with the following result:

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<tr>
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<tbody>
<tr>
<td>Silex</td>
<td>.64</td>
</tr>
<tr>
<td>Alumina</td>
<td>.29</td>
</tr>
<tr>
<td>Lime</td>
<td>.2</td>
</tr>
<tr>
<td>Potafl</td>
<td>.1</td>
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100

Adularia was first found by H. Pini in the mountains surrounding St. Gotthard, in Switzerland, especially in the fumitum called Mont Adula, (whence its name). It here occurs in crystals, lining the cavities of micaceous schistus.

2. Common Felspar.—The colour of this mineral is white, yellow, greyish, and reddish-white, also wax-yellow, and ochre-yellow, flesh-red, and blood-red, green, yellow-green, mountain-green, and, rarely, verdigris-green. It occurs in maf, disseminated, in rounded fragments, and crystallized. Its primitive form, and the other varieties of crystallization, are the same as those of adularia; it has also been found in ten-faded prisms, with dihedral, or other variously modified fumits. The crystals are for the most part small and middle-sized. Externally, this mineral is more or less thinning; internally, it is the same, with a lustre between vitreous and pearly. The longitudinal fracture is perfectly lamellar; the cross-fracture is fine-grained uneven, paling into splintery. Its fragments are rhomboidal, with four thinning, and two dull faces. It varies from translucent to opaque. It occurs often in large or small granular concretions. It is not so hard as quartz, yet will fracture glafs. It is brittle and easily flaking; fr. gr. 2.27 to 2.7.

It melts without addition, before the blow-pipe, into a white, somewhat translucent glafs.

Felspar has often been analyzed, and with very different results: that perhaps the most to be depended on is of the green Siberian felspar by Vauquelin, of which the following is the result:

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<tbody>
<tr>
<td>Silex</td>
<td>.59.83</td>
</tr>
<tr>
<td>Alumine</td>
<td>.17.02</td>
</tr>
<tr>
<td>Lime</td>
<td>.3</td>
</tr>
<tr>
<td>Oxyl of iron</td>
<td>1.</td>
</tr>
<tr>
<td>Potafl</td>
<td>.1</td>
</tr>
</tbody>
</table>

96.85

Felspar, when exposed to the weather, acquires gradually an earthy appearance, and at length passes into porcelain clay. It also occurs in a state of semi-decomposition in several varieties of granite, and porphyry, where it cannot have been affected by the atmosphere. When in this state it is usually of a yellowish or reddish-white colour, a faintly glimmering lustre, and a fracture imperfectly foliated, passing into earthy: it breaks into indeterminately angular fragments, is opaque, and considerably softer than common felspar. A very light-coloured variety was analyzed by Vauquelin, and found to consist of

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Some of the coloured translucent varieties of felspar contain particles of mica dispersed through their substance, and these, when the stone is exposed to the light, form to many luminous points which relieve the colour of the felspar, and give the whole a spangled appearance, that has a pleasing effect. When felspar exhibits this appearance it is called aventurine (a term also applied to a similarly glittering variety of quartz). The green Siberian felspar sometimes contains spangles of a remarkably brilliant silvery mica, forming a very elegant aventurine. Another fine variety has been procured from Fedelovati, an island in the White Sea, not far from Archangel, consisting of a transparent hyacinth-brown bale, with gold-coloured spangles.

Common felspar is the most generally distributed, both as to its local and geological situation, of any other mineral, except perhaps quartz. It is an essential constituent of granite and gneiss, of felsite and greenstone: it abounds in all porphyries, and in many rocks of trap-formation, and in the greater part of the red lavas.

3. Compact Felspar.—Felsite, Kirw. Its colour is blue-white, white, into sky-blue; or greenish-white, passing into brownish-green. The blue variety occurs in mafs, the green is either defferentiated or crystallized. It is thinning: its fracture is very imperfectly lamellar, approaching to splintery; its fragments are indeterminately angular; it is feebly translucent, and, though hard, considerably inferior to quartz.

It is fitful without addition, though difficultly, before the blow-pipe, into a frit or imperfect glafs. It has not been analyzed.

The blue compact variety was discovered by Widenmann at Krieglach, in Stiriia, forming a granitic mafs with white quartz and silvery mica: the green varieties occur in green porphyry and greenstone.

4. Continuous Felspar.—Its colour is reddish-grey, or flesh-coloured; or pale reddish-yellow, or olive-green. It occurs in mafs, and generally contains some crystallized felspar dispersed through it in various proportions. It is sometimes dull, but generally possesses a feebly glimmering lustre: it is translucent on the edges; its fracture is fine splintery, passing into uneven earthy; its fragments are indeterminately angular; its hardness is fully equal to that of common felspar, and it is less brittle. At a high heat it melts into a porous porcelain mafs.

5. Labrador Felspar.—The proper colour of this mineral is smoke-grey, or darkish colour, but, on account of the small crinicles between the lamellae of which it is composed, it presents a most beautiful play of vivid tints, varying according to the position in which it is viewed. Of this, it exhibits all the varieties from violet to flesh: of green, it displays the pure cragacal green, and various other tints, passing on one hand into blue, and on the other into yellow; of yellow, the usual tints are gold and lemon-yellow, passing into yellow-orange, and thence into rich copper-red, and tawny-brown. The parts exhibiting this beautiful colour are deposited in irregular spots and patches, and the same, as it is held in different positions, displays various tints. It has hitherto been found only in dissected cobble-sized

11 b
pieces. Internally it is shining with a lustre between pearly and vitreous; its principal fracture is perfectly lamellar in two directions, the lamelle crossing each other at right angles; its crosst fracture is somewhat conchoideal; it breaks into rhomboidal fragments, with four specular faces; it is strongly translucent, passing into semi-transparent. Sp. gr. 2.6 to 2.7.

It is fusible, without addition, before the blow-pipe, into a white enamel. According to Bindheim, who alone has analyzed this mineral, it consists of

| Silicium | 69.5 |
| Alumine | 12.6 |
| Sulphate of Lime | 12. |
| Oxide of Copper | 2.7 |
| Dittyo of Iron | 0.3 |

The length, and breadth, or the smallest diameter, is 13.6 or 14.0, and the thickness of 1.59 or 1.63. The length of the crosst, 12.0 or 12.2, has been estimated at 12.5, and is therefore 13.6 or 13.8, as the length of the space.

It was first discovered by the Moravian missionaries on the island of St. Paul, on the Labrador coast, and has since been found in Ingermannland, in Norway, and in the vicinity of lake Baikal, in Siberia.

It is in considerable estimation among lapidaries for ornamental works.

FELT, a kind of stuff, either of wool alone, or of wool and hair; neither spun, crocheted, nor woven, but deriving all its consistence from its being wrought, and fulled with teas and fize, and afterwards fashioned on a block or mould, by help of fire and water.

Cullors, canails, and coeys hair, lambs, and sheeps wool, &c. are the most usual ingredients of felt; and hats of all kinds are the works they are chiefly employed in.

The felt intended for a hat, being sufficiently fulled, and prepared, is reduced into one piece, somewhat in the figure of a large funnel; in which it is ready to be put into form, and becomes a hat. See Hat.

FELTING, in the Manufactures, denotes the operation by which the fur, hair, and wool of animals are wrought into a species of cloth, without either spinning or weaving. A hatter separates the hairs from each other by striking the wool with the fising of his bow, thus causing them to spring up in the air, and they then fall in every direction on the table, spread and distributed in small flocks, which the workman covers with a cloth, slightly moistened; pressing it with his hands, and moving the hairs backwards and forwards in different directions. In this manner the different fibres are brought against each other, and their points of contact considerably multiplied; and the agitation gives each hair a progressive motion towards the root, in consequence of which the hairs become twitlled together. As the scales become compact, the preasure should be increased, in order to keep up the progressive motion and turning of the hairs, which is thus performed with greater difficulty. The various fibres of the materials being thus by a gradual preasure in different directions made to interwim and croft each other, form a piece of stuff of a soft and spongy texture; upon this first piece is placed another, formed in the same manner, and sometimes a third or fourth, according to the nature of the materials, and the intended thickness and consistence of the work. These different pieces are successively brought together, and disposed in a form suitable to the article which is to be fabricated; and in order to effect the cohesion, the operator uses a number of preasures and alternate motions in different directions, during which he preserves the suppleness and flexibility of the material by flight aperions of water. The next operation is filling, which fcee. The hair intended for the manufacturing of hats is always cut off with a sharp instrument, and not pulled up by the roots; because the bulb of the hair, which would come out with it in the latter case, would render the end which was fixed in the skin very obtuse, and nearly destroy its disposition to unite with the adjacent hairs. The hairs should not be straight like needles, for then there would be no compactness in the stuff. The fibres of wool having naturally a crooked form, that substance is well adapted to the operation of felting. The hair of beavers, rabbits, hares, &c. being straight, cannot be used in felting; till it has been prepared for the purpose. See Hat.

FELTON, the Rev. William, in Biography, prebendary of Hereford, and a dilettante musician, above the common class of gentlemen performers. He was a good organ-player, and had a neat figure and powerful hand for common divisions, and the rapid multiplication of notes. As a composer he imitated Handel's organ concertos, and produced some of them, in which there were two concertos that were thought worth playing in London by Stanley at the Castle Concert, and Butler at Ranelagh. Two of his airs, with variations, were long the pride of every incipient player on the harpsichord in town and country.

FELTRI, in Geography, a town of Italy, and capital of the Feltrin, the see of a bishop, fullrigan of the patriarch of Aquila; situated at the foot of mountains generally covered with snow, which renders the air cold. The principal trade of the place is iron. The town has broad and well paved streets, a splendid town-house, a large and fine market place with fountains, a cathedral church, which yields a good income to the bishop, three monasteries, and three numeraries, a pawn-bank, and spacious suburbs, seated in a plain. The number of inhabitants is estimated at 5,200; 53 miles N.W. of Verona. Lat. 46° 24'. Long. 11° 48'.

FELTRINO, a river of Naples, which runs into the Adriatic, 4 miles S.E. of Ortona.

FELTRO, or FELUCCO, a little vessel with from ten to sixteen banks of oars, not covered over, much used in the Mediterranean as a passage boat. The natives of Barbary employ boats of this sort as cruisers.

The
The word is formed from the Arabic fidan, a ship.

It has this peculiarity, that the rudder may be applied either in the head or stern; there being dispositions in both to receive it. For this, it may be compared to a floop or shallop. It is rigged and navigated like a galley; which see.

FELUDSJ, Felija, or Felicha, in Geography, a small island in the N.W. part of the gulf of Penthi, near the coast of Arabia. N. lat. 29° 45'. E. long. 48°.

FEMALE, the sex that conceives and bears fruit.

An animal that generates within itself, is called female; and that which generates in another, male.

The female, in quadrupeds, and even in birds, is usually smaller and weaker than the male; though in birds of prey, as the falcon, hawk, &c. it is otherwise; the female being bigger, stronger, bolder, harder, and more courageous.

The like is observed in most insects, particularly spiders; to that degree, that M. Homberg assures us, he has weighed five or six male garden-spiders against one female of the same species, which has been equal to them all.

For the numeral proportion of males to females, see Marriage.

Naturalists also distinguish male and female plants; male and female flowers, &c.

FEMALE, in Botany. See Fertile Flowers.

FEMALE Flate-Player. See Flute, Lantia, and Amburge.

FEMALE Screw. See Screw.

FEMBLE HEMP, in Rural Economy, a name given in some districts to the female hemp.

FEME COVERT, in Law, denotes a married woman; who is also laid to be under covert-baron.

By the law of England, a female covert committing a bare theft in company with, or by coercion of, her husband, is not deemed guilty of felony; neither does she becomeaccessible to a felony, by receiving her husband who has been guilty of it, as he does by receiving her. But if she commit a theft by the bare command of her husband; or treason, murder, or robbery, in his company, or by his coercion, or keep a bawdy-house with him; she is punishable in the same manner, as if she were sole; and generally if she be guilty of any offence not capital, she may be indicted, &c. without making the husband a party. But if the incur the forfeiture of a penal statute, the husband must be made defendant in the action or information. (Hawk. P. C. b. i. c. 1.)

Among the Romans, a married woman was as capable of making a will as a feme-fol, but with this she is not only utterly incapable of deviting lands, but of making a testament of chattels, without the licence of her husband. For all her personal chattels are absolutely his. Yet by her husband's licence the may make a testament, and the husband, upon marriage, frequently covenants with her friends to allow her that licence. The Queen connotes an exception to this general rule, for she may dispoſe of her chattels by will, without the consent of her lord. (Co. Litt. 23.) and any feme-covert may make her will of goods, which are in her possession in autre droit, as executrix or administratrix, for these can never be the property of the husband; and if she has any pin-money, or separate maintenance, it is said she may dispose of her fave passages by testament, without the control of her husband. (Pr. Chan. 44.) A feme-covert may purchas an estate without the consent of her husband, and the conveyance is good during the coverture, till he avoids it by some act declaring his dintel. (Co. Litt. 3.) See more on this subject under the article Coverture.

FEME sole, an unmarried woman, whose debts contracted before marriage become those of her husband after it. If a feme sole makes her will, and afterwards marries, such subsequent marriage is deemed a revocation in law, and entirely vacates the will. See Custom of London.

FEMERN, in Geography, an island of Denmark, in the Baltic, separated from Holten by a narrow strait, called "Femern Sound," about 27 miles in circumference. It contains the town of Purg, and a few villages. This island is though small, but always been considered as one of the keys of Denmark towards Germany. There is a fort at the landing place from Holten. N. lat. 54° 53'. E. long. 11°.

FEMININE, or FEMINIST, in Grammar, one of the genders of nouns.

The feminine gender is that which denotes the noun or name to belong to a female. In the Latin, the feminine gender is formed of the masculine, by altering its termination; particularly by changing es into a. Thus, the masculine bonus equalis, a good horse, is formed the feminine, bona equalis, a good mare; &c. of parus homas, a little man, is formed paras feminas, a little woman, &c. In French, the feminine gender is expressed, not by a different termination, but a different article: thus, le is joined to a male, and la to a female.

In English, we are generally more strict, and express the difference of sex, not by different terminations, nor by different particles, but different words; as bear and bees, boy and girls, brother and sister, &c. though sometimes the feminine is formed by varying the termination of the male into es, as in abbot, abbess, &c.

FEMINE RHYMES. See Rhyme.

FEM-OWL, in Ornithology, an English name used in Shropshire, and some other counties, for the caprimulcous, or goat-fucker, called also the churn-owl. It is a very beautiful bird, and more resembles the cuckow than the owl-kind. See Caprimulcous.

FEMSIO, in Geography, a town of Sweden, in the province of Skane; 50 miles W. of Wexio.

FEMUR, or Os Femoris, in Anatomy, the bone of the thigh. See Extremities.

FEN, in Agriculture, a term commonly made use of to signify lands which are of the soft, boggy, or marshy kind; and which, from the great stagnation and retention of moisture, are disposed to the growth and production of different coarse vegetables, as well as to become unhealthy for those who inhabit them. In different districts of the kingdom, as in the counties of Lincoln, Cambridge, and those which adjoin them, immense tracts of this description of lands are still to be met with; which, by proper means, such as those of inclining, effectual draining, paring and burning, and the growth of suitable kinds of crops, might be rendered of vast importance to individuals as well as the nation, but which in their present state afford scarcely any thing, except rushes, feeds, fedges, and coarse grasses.

The lands of this kind differ in their qualities according to the progress they have made to the state of firmness from the gradual depostitions of earthy matters; in some cafes being quite solid, while, in others, they are covered with water, except some small portions which rise above the surface in particular places. The former are mostly without any rivers passing into or through them, but the latter have commonly springs rising in them, and become the sources of rivers.

The first sort of fen lands is mostly injured by the Rag.
FEN.

The main drain or drains, in cases of this kind, should constantly have sufficient depth and width to readily discharge the water from the whole extent of the land; and the flood and tide waters be kept as much as possible from flowing upon the lands by proper embanking and the use of flood-gates, as suggested above. See Embankment and Flood-gate.

In most other places the drainage of these sorts of lands may be conducted in the same way as for common draining. See Draining.

When fen lands have been rendered sufficiently dry by proper draining, and are become in a state of proper fertility for carrying on the operation of tillage, where they contain much coarse vegetable matter upon their surfaces, the most advantageous method is to begin by paring and burning, which will afford an excellent preparation for a crop of rape, or even turnips where the lands are free from too much flagrant moisture; and either of these kinds of crops will leave the grounds in excellent condition for potatoes, beans, or cabbages, with which they should be constantly cropped until they are brought into a suitable state for the growth of grain, when a few crops of this sort may be taken in alternation with those of the green kind, keeping it always in mind that the great object is to lay them down as soon as possible to grass, for which they are in general the best calculated.

In the introduction of grain crops, it is for the most part the best to begin with oats, as such sorts of land are commonly well adapted to them. The other kinds may afterwards be had recourse to according to circumstances.

It has been stated by the writer of the "Survey of the County of Lincoln," that the probable improvement that might be made by the inclining, draining, paring and burning, and judicious cropping of the east and west fens in that district, would not be less than is stated below.

| Present Value, Dr. | Improved Value, Cr. | Val. per Acre | Rent.
<table>
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<tr>
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<tbody>
<tr>
<td>£. s. d.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To present value of all the common rights in the east and west fens</td>
<td>4173 5 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>By the west fen</td>
<td>-</td>
<td>16,914</td>
<td>2 6</td>
</tr>
<tr>
<td>By the east fen</td>
<td>-</td>
<td>12,424</td>
<td>3 9</td>
</tr>
<tr>
<td>Total improved value, Cr.</td>
<td>29,349</td>
<td>2 5</td>
<td></td>
</tr>
<tr>
<td>Deduct the former value</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Net improvement</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>A. R. P.</th>
<th>Val. per Acre</th>
<th>£. s. d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the Wild-</td>
<td>10,661</td>
<td>2 25</td>
</tr>
<tr>
<td>more fen</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Deduct Dr. as opposite</td>
<td>1,515 13 1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Val. per Acre</th>
<th>£. s. d.</th>
</tr>
</thead>
<tbody>
<tr>
<td>By the Wild-</td>
<td>10,661</td>
</tr>
<tr>
<td>more fen</td>
<td>1,515</td>
</tr>
</tbody>
</table>

The whole improvement of the east and west Wild- fen | 31,216 | 0 8 |

It.
It is remarked, that the calculation is drawn from the average of the common rights of two different parishes, those of Louthby and Reveby, the one being detached a considerable distance from the common, and the other greatly nearer, which furnishes a tolerable data for the whole of the town; and if those two parishes common rights produce a given sum, and their two shares of land-tax amount for Louthby, 40l. Reveby, 237l.; all the parishes which have rights upon the fen, amounting to 397s. 15l. produce the sum of 4,173l. 5s. per year, which gives the present value of the common rights upon the fen, from 29,349 acres, at about 2s. 10½d. the acre; when, by the improvement from an inclosure, the fame 29,349 acres would produce 26,243l. per year, which averages about 17s. 11½d. the acre, and which is the moderate average value; although there are certain lands taken in to defray the expense of draining the well fen, let by auction for 34s. the acre; in the average about 4,000 acres in farms.

It is suggested, that the chief reason why these fences are so unprofitable in their present state, is from the disorder in flocking; because human nature being in its various capacities anxious of property, some persons, from aversion, or a wish to get rich at once, flock so largely as to injure themselves, and oppresse the common; others, in the line of jobbing, put in great quantities of flock to fell again, which are altogether injurious to the fair commoner, who only flocks with what his farm produces. Because, suppose one man flocks a pasture of 29,349 acres, he would consider the different sorts of cattle to be depauperated thereon, for each to thrive and yield their proportionable share of profit; but if 5,000 men flock, they have different views of supposing interest; some increase their breed of sheep, beavers, horses, geese, &c. There are instances of a cotter renting five pounds per year having fifteen hundred or two thousand breeding geese, which must injure his neighbour of five pounds per year, who has got only a few sheep, or a cow. The chief proprietors of these fens have long had their improvement in contemplation, especially since so many inferior neighbours have been embanked and inclosed to such advantage, and particularly as it is evident that if this was the case, they would produce a yearly rent of 26,243l. 8s. 8d. There are plough farms being estimated to produce three years rent, 78,729l. 17s. which increase of property would, it is supposed employ more poor, maintain more farmers, increase trade, and produce great quantities of grain, which now costs English money to import from foreign nations. The reasons why the proceeding has been so long delayed has been the extent of the undertaking, and the intermixture of large mortmain estates, with some differences in the rights between the fens of Balbybrook and Holland town. This great work has however face, we believe, been accomplished, and a vast extent of valuable land reclaimed and brought into the state of cultivation.

It was formerly supposed that fens were of great advantage to those who resided in the vicinity of them, in the large quantities of foul and fish which they afforded; but this does not appear to be really the case, when the value of the land in other views is fully considered. The kinds of wild foul with which they principally abound are those of the wild-duck and teal sorts, which are often extremely numerous, being taken in decoys, and conveyed to the London markets.

The fish are chiefly pike and eels, which are in great numbers of large size, and taken without any very great difficulty; but they are far not to be so delicate for eating as those of some other situations.

But the principal benefit was probably derived from the vast number of geese that were kept upon them, as, besides their use as food, they afforded very considerable profits in the feathers and quills. It is shown by the books in the custom-house at Boston, in the county of Lincoln, that formerly there were not unfrequently sent away from that place, in one year, the quantity of three hundred bags of feathers, each bag containing one hundred and a half weight. They pluck the geese several times in the year for the feathers, and once for the quills. See Feathers and Goose.

Fen, in Rural Economy, the name of a pernicious dis- temper to which the hop is particularly exposed. It consists of a mould or nits, which grows with great rapidity, spreading itself greatly, and occasioning much injury in the hop plantation. The fine smell and condition of the hop are in this way very much impaired.

Fence, in Agriculture, a term signifying any sort of construction raised for the purpose of inclosing land, such as a bank of earth, a ditch, hedge, wall, railing, palisade, or any similar kind of erection.

It seems evident that fences only became known, and were recurved, as the pastoral state of society disappeared; and that during that of the feudal system they were but little necessary, except in the case of villages, for the purpose of inclosing the little portions of grass lands, which were scattered about them; or in particular instances for protecting the more exposed parts of parish fields, while they were kept in the state of corn.

In this country, however, fences are now generally prevalent, except where the remains of the feudal practice is still permitted to continue, and where the appropriated mountains and high lands are managed under the sheep system; and where the extensive ranges of chalk hills in the state of appropriation, which are more favourably situated and conducted under a mixed kind of cultivation, are still wholly open. These hills are, however, particularly suited to the sheep husbandry, the more elevated, bleak, and least fertile parts of them having constantly been kept in the state of sheep walks by their occupiers. Consequent large flocks of sheep are preferred on them under the care of shepherds, who attend them during the day, and fold them in the night, by which practice the crops are effectually protected from injury.

But whether this system of management be proper or the contrary, it is clear that wherever horses, neat cattle, or small numbers of sheep, which have not the attendance of shepherds, are the paltering flock, fences become detrimental to the due cultiva of the land.

The materials which are the most commonly employed in the raising of fences are, earthy substances, being parts of various kinds, flax, bricks, and wood of different sorts. Iron, and even rope, or cord, are likewise occasionally made use of for forming fences.

The first of these, though frequently made use of in the forming of fences, are far from being good materials for the purpose, as they soon begin to decompose by the action of the air, and mould away, leaving any sort of plants that may have been let upon them in a naked and exposed condition. In most situations they likewise become dry and parched by the heat of the sun in the summer months, that the plants never thrive properly upon them. They are also very apt to be thrown down by neat cattle and sheep, rubbing against them in hot seasons. These mounds fences are much met with in different counties, as Devonshire, Lancashire, and the lowest parts of Wales.

The second sort of bulwarks for the purpose of fences affords great variety, there being many kinds of plants that answer
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answer perfectly well, but the best are unquestionably the white thorn and the holly. The black thorn, hawthorn, and crab-tree, may likewise be used in the same way. Fences made with some of these sorts of plants are by much the best and most durable.

Several other kinds of plants may likewise be employed in forming live fences, as the willow, the elder, the birch, and the elder for moist situations; the beech on those that are high and exposed; and the elm and hornbeam where they are low and the soil inclining to be heavy. These two last are, however, but little had recourse to in this intention. Of the willow there are many sorts, all of which may be cut into truncunes of suitable lengths, and planted in that way.

Stones and bricks make excellent fences, both in respect to convenience and durability; but they are mostly much too expensive, except where they are abundant, and labour cheap. The latter can only be employed on particular occasions, and under particular circumstances, chiefly where ornament is required. On hilly, low, mountainous, and other lofty-exposed situations, where live fences cannot be raised without great difficulty, and shelter is not required, walls are capable of being had recourse to with advantage, and are commonly the most proper sort for fences for the purpose. In less elevated districts, where these sorts of materials are readily procured, fences of the willow kind are likewise not unfrequently met with, as constituting the division of lands merely in the state of tillage, as well as for the confining of the inferior sorts of live stock. Their appearance is, however, extremely naked and dissolute.

Wood is a sort of material which is certainly the worst and most expensive that can be had recourse to in the construction of fences; as whether it be the smaller sorts of wood for the forming of dead hedges, the defending of the banks of ditches, &c.; or the larger kind of timber-wood employed in making paling, railing, and other similar fences, it may be said to be in a constant progressive state of decay from the very period of its being put up. It can of course be very rarely made use of as a fence, except in the case of dead hedges, where living ones cannot be raised; and for inclosing about the farm-steads and parks, or other pleasure-grounds, where ornament is required, or in the form of paling, for protecting new-planted quickset hedges, &c.

The two last materials can evidently never be had recourse to as farm-fences from their expensive nature; it is only in ornamented grounds, where a peculiar degree of neatness is required, that they can be employed. The latter is a very perishable kind of material, and the former fluids in need of frequent expensive painting, to preserve it from decay.

Fences may be capable of being divided, from the nature of their constitution, into two classes or kinds, as

1. Simple Fences.
2. Compound Fences.

The first class, or division, comprehends all those which are sufficient of themselves for the purposes of inclosure, without requiring the allantise of any other sort; as those of simple ditches, dikes, hedges, walls, palings, railings, &c.

The second class comprehends all such kinds as stand in need of the allantise of some other kinds, in order to guard and protect them in their young growth, or which may render them more safe and secure when farther advanced; as hedge and ditch, or bank, hedge ditch and paling, hedge ditch and railing, double hedges, hedge and wall, hedge ditch and wall, hedge ditch and trees, hedge, or hedge, wall, and belt of planting, and others of the same kind.

After this arrangement and division of fences, it will be proper to consider the different kinds in a separate manner, in order to explain more fully their particular nature and advantages, as well as the most proper methods of constructing and preferring them so as to render them the most durable.

Simple Fences.—These are mostly formed with much less trouble, and kept in order with far less difficulty, than those of the compound kind.

Open ditch, or water fence.—This sort of fence consists simply in a ditch of considerable width and depth, which is kept as full of water as possible. It has been remarked by a late writer on this subject, that though ditches now commonly form a part of that class of fences which are termed compound, they in their simple and original state were considered rather in the light of open drains; and in place of being looked upon as a fence, their greatest benefit was supposed to arise from their receiving or carrying off the superfluous moisture from the inclosed field. In a variety of instances, ditches are made for this purpose only, where there is no more to be done than to inclose the field. They are, however, sometimes meant as fences; but, in such cases, they are made very deep and wide, and the earth taken out of them is sometimes formed into a bank, the height of which, when added to the depth of the ditch, forms a tolerable barrier. In general, however, the greatest value of the ditch is met with, when it is used in conjunction with other fences, as will be seen under the second class, or compound fences.

The forms of ditches are various; some of them being of an uniform width both at top and bottom; others are wide above, and have a gradual slope downwards; those of a third kind have one side sloping, and the other perpendicular. For whatever purpose the ditch is meant, however, the sloping form is by much the best, as it not only cools the surface but renders the digging, but is at the same time much more durable, and has a better appearance. Where open ditches are indispensably necessary for the drainage of the field, the sloping ditch is preferable to every other, as the sides are not liable to tumble in or be undermined, or excavated by the current of the water, when properly executed. The slope should be considerable, perhaps not less than three times the width at top that it is at bottom. The advantages of this construction will, however, be more fully explained in speaking of hedge and ditch fucces.

It has been remarked that the open ditch, with a wall or perpendicular sides, is liable to much objection both in its simple and compound state: that in its simple state the sides are perpetually tumbling in, especially after frosts or heavy rains; and if the field round which these ditches are made has any considerable declivity, the bottom is undermined, and large masses tumble down, bringing the hedge along with them. These circumstances are of themselves sufficient to bring this kind of ditch into disuse; but while they are thus improper as open drains, owing to the circumstances we have mentioned, their shape is, it is conceived, the best possible for a covered drain, as the broader these covered drains are at bottom the more water will they carry off; with this additional benefit, that, by being broad below, they are less liable to choking, or obstruction, than if they were narrow; in which case a single stone or two clapping close together, will so far interrupt the course of the water, and so much sand and mud will accumulate behind them, as to render the drain use less: whereas, when there is a sufficient
ent breadth at bottom, if the water is obstructed by one
fence, it readily finds a passage in some other place.

The open ditch, or water fence, is most commonly employed
in hard, marshy, and fen-land situations; and where it is made
of the width of not less than half a statute pole, and is
capable of being preferred constantly full of water, it may be
a ineligible fence, even in the summer season. But in open
extensive tracts, where the land is much exposed, from its
affording little shelter, it is obviously an improper fence.
In severe frosts it also loses its qualities as a fence against
sheep; and when they are more flight, and the ice covered
with snow, but not sufficiently fold to support the weight
of sheep, often betrays them to their destruction. In par-
ticular situations it is, however, the only fort of fence that
may in some measure, serve it.

Simple ditch, and bank of earth.—This is a kind of
fence which consists simply of a gradually sloping ditch, in
or small side-ditches, a few yards from their opening into
which the earth is removed in forming, it is hid up into
the main ditch; and, in place of permitting the water to
fall upon the bank in a straight line, to give the furrows or
side-ditches a gentle curve; by that means, instead of falling
into the ditch in a straight line, and acting against the bank
in the manner described, the furrows will empty themselves
into it in an oblique direction, and, by joining immediately
with the stream in the ditch, will be prevented from having
any bad effect upon the bank. It is obvious that the water,
by thus having its direction changed, can do no harm to the
sides of the main ditch; and what is of advantage, the earth
and sediment brought along with it from the high ground,
instead of being deposited in that place where the cutenter
the main ditch, which seldom falls to be the cafe where
the water falls into it in a straight line, are carried off along
with it; and though this sediment ultimately falls to the
bottom of the ditch, yet, as it falls down gradually in its
course, it is equally divided over the whole, and occasions no
obstruction in any particular part of the ditch. This form
of fence is shown at fig. 2, in the same plate, in which a, b,
are the two ditches, and $ b $ the intermediate bank of earth.

Where soils are moist and retentive, this is often a ben-
eficial method for raising live fences, both with the thorn, and
other forts of hedge-plants.

There are other methods of constructing fences of this
nature. They are in some cases formed by raising up long
piles of earth between two sod facings, in a battering man-
er, or leaning somewhat inwards towards each other, to
the necessary heights and widths, as will be seen below.

Various other modes of planting on banks of this nature
raised to different heights, have also been practiced in differ-
ent districts of the kingdom.

Bank of earth with perpendicular sod-facing and slops be-
hind.—This, it may be observed, is a very common fort of
fence, and in some situations extremely useful, as in making
folds, for instance, for the confinement of sheep or cattle.
It is also valuable on the sides of highways, for defending
the adjoining grounds, and for laying off clumps or belts of
planting in the middle or corners of fields, for inclosing
black-yards, cottages, gardens, and other similar purposes.
The front of the bank is made with the sod pared off from
the surface of the sloping ditch, and the mound at the back
with the earth taken out of it. In all cases, it is remarked,
where this fence is used in the field, the perpendicular front
should be made on the outside, and the bank on the inside
of the field. But when it is employed for folds, the front
should be on the inside of the fold, as in that way it will not
only present a much more formidable appearance to the
sheep or cattle, but the depth of the ditch will be an addi-
tion to the height of the bank; and the earth taken out of
it being laid behind will serve as a kind of buttress to sup-
port the facing of sod, and give it a degree of firmness and
durability, far superior to that of the common turf walls, or
fold-banks, as they are generally termed in North Britain.
When this fence is properly constructed, a work at which
the labourers in that part of the kingdom are now pretty
expert, it lasts a considerable time; but in its most perfect
state it is only to be considered as a temporary expedient;
for however neat it may appear, or however well it may answer
the purpose at first, it ultimately loses its value. Where
wood for palings is scarce, or cannot be had, and where other
materials for the shelter or protection of young hedges are
equally scanty, this may be used with advantage for a time,
and will both shelter the young hedge and inclose the field;
but where permanent plans of inclosing are intended it
should never be had recourse to, as however cheap it may
be in the first instance, it is by no means durable. It is
represented
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represented at fig. 3, in which a shows the half-footlion of a high road; b the sloping bank of earth on the side; and c the perpendicular facing of turf or sod in the front.

Perpendicular earth-wall.—This is a species of fence that may be occasionally had recourse to with advantage, as in inclining rabbit-warrens, and other similar cases, where better forts of materials cannot be provided, except at too great expense. But it is only a temporary kind of inclosure, as the sod soon decay, and begin to moulder down. And by neat cattle, sheep, and swine such fences are soon thrown down and destroyed. When it is employed, it should have the ditch on the incline or piece of ground that is inclined, and the turf, or sod, cut out from the surface of it, being well backed with the earth taken from below. It is shown at fig. 4, in the same plate. Under the head wall-fence below, this sort of wall is more fully explained, in speaking of turf-walls.

Habba, or thatch fence.—It has been observed by Mr. Somerville, that this description of fence is calculated chiefly for fields that require no shelter, and where an uniform unbroken prospect is an object to be preferred, as is the case in pleasure-grounds, gardens, and extensive lawns; but in all situations where shelter is wanted, the funk fence ought to be avoided, unless a hedge is planted upon the top of it. The form of the funk fence very nearly resembles the mound of earth with the perpendicular facing of turf just described, with this difference, that the facing of the former is turf or sod, and the height of the fence depends entirely, or in a great measure, upon the depth of the ditch. While these funk fences are either faced with brick, dry-flone, or flone and lime, and are of various heights, according to the ideas of the proprietor, or the circumstances of the case. In the Agricultural Report drawn from the northern districts, in the account of Cromarty the following description of the funk fence is given: "Upon the line where this fence is intended, begin to sink your ditch, making the earth from as far as eight feet outward, and throwing it up on the incline of the line. This ditch and bank is not made quite perpendicular, but inclining inward towards the field as it rises; to this is built a facing of dry-flone, four feet and a half in height, one and three-quarters broad at bottom, and one foot at top, over which a coping of turf is laid: the ditch or funk part forms an excellent drain. The whole of this is then performed when the flone can be procured at about a quarter of a mile distance, for 6d. per yard." But in other cases it will stand greatly higher, according to the distance of the materials, the price of labour, and various other circumstances. It is a sort of fence which is seen at fig. 5, in the annexed plate.

With regard to the advantages of ditches as fences, it has already been observed, that none of the different kinds of ditches, taken by themselves to be considered as good fences, with the single exception of the funk fence, which is under the necessity of being chained along with them. This last fort answers the double purpose of an open drain and a fence. But though ditches in their simple state, are thus defective as fences, their use is attended with many advantages; not only in draining the field, but in affording a supply of earth, which, under proper management, may be converted into excellent manure. Where the soil in which ditches are made is deep, and of a good quality, the earth taken out of them, if it is either made into compost with lime or dung, or even spread by itself upon the adjoining fields, will greatly increase their fertility, and prove a lauding and valuable improvement. Even where the soil is mofl or clay, it may be converted to the same valuable purpose by burning: mofl being burnt, and the ashes used as manure in many parts of the kingdom; and the same is the case with clay. It has been found in the marshes of Somerset-shire that the clay taken out of the ditches and burnt is, upon strong tenacious soils, highly valuable; as it breaks their cohesion, and by that means renders them not only less retentive of moisture, and of course easier cultivated, but also much more favourable to the growth of plants, by affording room for the roots to extend and stiffen themselves out in search of food. Their value, as making a part of any of the compound fences, will be further seen below, and under the article ditto and hedge.

Compound ditch fence.—This is that sort of fence in which the ditch is only a constituent part, being combined with some other, in order to form a perfect fence.

Double ditch and hedge.—This is a kind of fence sometimes employed in the inclosing of land. In considering the double ditch as a simple fence, its use, and the various situations in which it is applicable, whether as a fence or an open drain, have been noticed. To what has been mentioned, we may add that the custom of inclosing with double ditches, and a hedge in front of each, is now practised in many parts of the kingdom, especially upon what are termed cold lands; from an idea, that a single row of plants would not grow sufficiently strong or thick to form a proper fence. The advocates for this sort of fence farther allege, that in addition to the two rows of plants forming a more sufficient fence, an opportunity is afforded of planting a row or rows of trees in the middle of the bank, as represented at fig. 6, in the plate.

It has been observed that the double ditch and hedge is liable to many objections; the expense of forming the ditches, the hedge-plants made use of, and the ground occupied thereby, being double of what is requisite in a single ditch and hedge. In order to form a perfect fence, the leaf that is required for a double ditch and hedge; this space, in the circumference of a large field, is so considerable, that upon a farm of 500 acres, divided into fifteen inclosures, the fences alone would occupy above forty acres. By throwing up a bank in the middle, the whole of the nourishment, not only of both hedges, but also of the row of trees, is confined foldly to that space, which, from its being infiltrated by the ditches, and elevated so much above the common surface, not only curtails the nourishment of the hedges and row of trees, but exposes them to all the injuries arising from drought, frost, &c. The idea of two rows of plants making a better fence than one, is certainly a good reason for such an unnecessary waste of land and money, as in almost every instance, where the plants are properly adapted to the soil and climate, one row will be found quite sufficient; but, if it should be preferred to have two rows, the purpose will be answered equally well with a single ditch, or even without any ditch at all; for in every situation where the soil is tolerably dry, and the fields much elevated above the level of the sea, the ditches except for the purpose of drainage, may be dispensed with.

In addition to the double ditch, and while the hedges are still young, the fence is sometimes strengthened by a paling, either of young hirs or other wood placed upon the top of the bank; in other cases, a dead hedge is put in the middle, between the two quick hedges; and not unfrequently an open wall, resembling a Galloway-dike, made with round stones, is placed in the same situation; any of which, when properly executed, not only inclose the field completely for the time, but also very effectually shelter the young plants that constitute the fence. Under every circumstance this is a very expensive sort of fence.

Simple hedge fences.—These are of two kinds; either

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such as are made up of dead materials, or such as are formed of living plants, of some fort or other. They are likewise made in different ways according to custom and circumstances.

Dead hedges.—It may be observed that these are made either with the prunings of trees, or the tops of old thorn, beech, or other hedges that have been cut down; and are principally intended for temporary purposes, such as the protection of young hedges till they have acquired a sufficient degree of strength to render them feasible without any other assistance. For this purpose the dead hedge is well adapted, and lasts so long as to enable the live fence to grow up and complete the inclosure.

In many cases, however, dead hedges are had recourse to as the sole fence, and where there is no intention of planting quicks, or any other hedge. From their very perishable nature, however, they are found to be exceedingly expensive; so much so, indeed, that, after the first or second year, they cannot be kept in repair at a less expense than from a fifth to a tenth part of the value of the land, and sometimes more. When dead hedges are meant for the protection of young live fences, if the quick fence is planted upon the common surface, the dead hedge is made in a trench or furrow immediately behind it, in such a way as to prevent the sheep or cattle grazing in the enclosed field from injuring it. Where the quick fence, however, is planted upon the side of a ditch, the dead hedge is, for the most part, made on the top of the mound formed by the earth taken out of the ditch; these are called plain dead hedges, being made by cutting the thorns or brushwood, of which they consist, into certain lengths, and fllicking or putting them into the earth. They are called plain, in opposition to other descriptions of dead hedges, where more art is used; such as the dead hedge with upright stakes wattled, and the common plaited hedge, bound together at the top with willows; but of which the reader will be able to form a much better idea than can well be conveyed by words, by consulting the annexed plates; in which fig. 7, represents a dead hedge inclining a little, placed upon the plain surface in the ordinary manner; fig. 8, the common dead hedge; which, it is observed, is almost the only fence met with in several of the counties of England, with the thorns or dead wood let into the earth about twelve or fourteen inches, and fastened at the top with willows or hazels; fig. 9, shews the wattled dead hedges, with thorn upright poles, or what is generally termed pack and rife, or in Scotland pack and rive, and in some places flaff and band. This half, and the one immediately preceding it, form, it is remarked, very handsome fences; it is only to be regretted that they are not permanent ones, seldom lasting above a year or two. This defect is complained of in many of the reports published under the authority of the Board of Agriculture. The words of the surveyor of one of which are: “dead fencing supplies the place of live, which occasions an eternal expense to the occupier; if, in purchasing the fencing stuff, and bringing it from a considerable distance, and, 2dly, in the delay of his interest, by reason that the land occupied by a dead fence might fall into a live one, which would not only amount the present purpose, but, in place of decaying, would be annually improving.” The truth of this observation cannot be disputed; as the soil and climate, in almost every situation where these dead hedges are complained of, are such, that hedges of live plants would not easily grow, but could be made at equal, perhaps less expense, than these temporary erections; and with this advantage, that, in place of decaying, and occasioning an end to its expense for repairs, they would be every year growing stronger, would require little expense to support them, and, in place of the forlorn decayed appearance which dead hedges never fail to give a country, they would at once shelter and ornament it. It cannot, therefore, in the opinion of Mr. Sommerville, be too strongly recommended to proprietors and farmers, in those parts where dead hedges are in use for so much used, and to justify complainers of, to substitute live hedges in their place; the expense of doing which will be trifling, and the benefit arising therefrom immense.

In carrying the plan of this kind into execution, there is no occasion to throw such fields as are at present inclosed with these temporary fences open; quite the contrary: the dead fencesought to be preferred till the young plants have attained such a strength and size as to enable them to form a good fence without any auxiliary aid. In that way the inclosure will not only be preferred, but the dead fence, from the shelter it will afford to the young plants, will accelerate their growth, and render them much sooner useful than they would otherwise be. This change of system would be at once pleasant and profitable to all concerned; the expense of inclosing, which is at present feverishly felt, would be done away; the appearance of the country considerably improved, and the public benefited in a great degree; and, as no doubts can be raised as to the practicability of this scheme, it is trufb that the bare mention of it will be sufficient to dictate a better system of inclosing to those concerned. The idea entertained by some landlords, that, provided a farm is once let, with the usual burden upon the tenant of supporting the fences, the nature of the fence is of no importance to them, deferves the strongest and most pointed reprobation: indeed, it could scarcely be supposed that men, who have a permanent interest in the property, would reason in such a manner. There can be no doubt, if lands are let to a good tenant for a term of years, that the landlord is certain of drawing his rent during the currency of the lease, whatever the expense of supporting the fences may be; but if this tenant is a man of fense, the offer he makes will proceed upon the value he has in his own mind formed of the nature of the soil, and the expense which must unavoidably arise from cultivating and sheltering it, and bringing the produce to market: the farmer who has not made, or is not capable of making such a calculation, can never be a desirable tenant to any proprietor; but if the tenant poftiples this necessary knowledge, the yearly rent will be more for the farm will be left in proportion to the farm which he expects annually to expend in constructing or supporting these fences. It is trufb, that such vigilant observation is necessary to convince intelligent proprietors or farmers, that the substitution of live for dead fences will not only make the fences more perfect, but will make an addition to the annual value of the property, equal to, if not greater, than the expense at present incurred in keeping these dead fences in repair. It need hardly be added, that as the greatest value of these fences consists in their completing inclosures, and sheltering the young hedges, till they arrive at a certain age, they should never be thought of by either proprietors or farmers, except for the other or other temporary purposes.

In the making of all sorts of dead hedge fences, considerable art is required to perform it in a proper manner, and so as to become the most durable and lasting possible. Whatever the nature of the materials may be which are to be employed in this way, they should be neatly deposited and wrought into the fence, according to the manner in which it is to be made.

Live hedges.—These may in general be considered as the ordinary farm fences of this country. And, except in parts of...
particular situations and circumstances, and for particular purposes, they are unquestionably the most proper and useful.

It is found, that in districts which have been for a considerable length of time enclosed from the pastoral or forest state, without having previously undergone cultivation, the hedges are seemingly of great age, having mostly crooked irregular directions, as if originally formed out of the bushwood of such forests, or walls. While, in other cases, coppice-woods of different sorts are found growing on low, wide banks, which seem as if they had been formerly gathered in the woods, and afterwards planted in such banks. The practice of planting out full grown plants in this way has, however, been long, in general, disdained in this kingdom, and young hedges chiefly raised with plants of a few years' growth, planted in different ways according to situations and circumstances, being first reared for the purpose in some proper place.

In respect to live hedges, it may likewise be further observed, that they are in general made either entirely with one kind of plants, or a mixture of different kinds; and for this purpose almost every tree or shrub known in Britain is either wholly or in part employed.

In closing of Land some account will be given of each; but there are certain circumstances common to all of them, and upon which the success of every attempt made to rear good fences will be found ultimately to depend. These circumstances are, 1st, the plants being suited to the soil and climate; 2dly, the preparation of the earth or soil; 3dly, the time and mode of planting; 4thly, the age of the plants; 5thly, the size of them; 6thly, the dressing or pruning of the tops and roots before planting; 7thly, weeding and hoeing them while growing; 8thly, trimming and after-management; 9thly, filling up the gaps in hedges; 10thly, diseases to which hedge-plants are liable, and their remedies.

With regard to the firr, it has been observed, that upon the proper choice of plants suited to the soil and climate where the hedge is to be made, the success of every attempt to inclose with live fences will be found to depend. A mind given to observation, and capable of applying it in practice, may receive considerable assistance upon this point by attending carefully to the indigenous trees or shrubs which thrive well, and attain the greatest size and perfection, upon particular soils in certain climates: by an attention of this part many plants, which are seemingly of small value at present, might, it is remarked, be rendered highly useful by planting hedges with them. But though an observation of this kind will in some infinences serve as a guide, and lead the person who makes it to certain useful practices, it is not always to be depended upon, as there are many situations where neither trees nor shrubs, fit for making hedges, are to be met with in an indigenous state; and even when they are met with, their nature will not admit of their being transplanted. Fortunately in these cases, though nature affords no guide to affix as in the choice of the plants, we shall find sufficient direction from the experience of the country, by carefully noting the circumstances of soil and climate under which certain plants that have been introduced into them have prospered, and either taken into trees, or made good fences. In speaking of the nature of inclosing land, notice will be taken of the great lofs which attend the fence, and the plants of which it confihs, in not being properly adapted to the natural circumstances of the soil they are meant to inclose. Many mistakes of this kind might be enumerated; especially in the more elevated situations, where great labour and expense have been employed to raise hedges of hawthorn, which, after many years' care and attention, were found totally unfit for such inclement regions. In such situations, experience has now sufficiently proved that good fences can be reared in a short time with beech, birch, larch, and the Huntingdon willow; hedges of these kinds ought, therefore, to be the only ones used in hilly countries, or upon cold wet soils. The three first upon the dry soils, and the last, with the addition of poplars, upon such as are wet, or marshy. In the low country, however, and in the lefts elevated part of the uplands, the white thorn will be found the belt upon all the dry, or moderately dry parts of the soil; especially the different kinds of loamy, sandy, or gravelly kinds: upon clays, or cold wet soils, however, beech, crab, birch, poplar, willow, and alder, may be used with advantage. The birch, poplar, alder, and Huntingdon willow, are peculiarly calculated for the coldest, wettest, and most marshy parts; while beech, crab, &c. will be found to answer best upon the stiff clays. Hazel, sweet-briar, mountain ash, or rowan-tree, and indeed all the different kinds of forest trees that are at present known to delight in dry soils, may also be employed for making hedges in the low lands with succces; but which-ever of these is used, they should, if possible, be without mixture, or have as little of it as possible. See Inclosing of Land.

It may be remarked, that it is seldom indeed that any soil, however good, will be found equally favourable to the growth of plants so very opposite in their nature; this circumstance alone will render their growth unequal, and of course make the fence faulty and defective. These defects in the fence, and inequalities in the growth of the plants, will increase with time, become every day more apparent, and be every day more sensibly felt; as the plants which have thus acquired the ascendancy will continue to keep it, and not only shade the weaker ones, and prevent them from enjoying the influence of the sun and air, but also deprive them of nourishment. Independent of these considerations, there is another, it is observed, of equal, perhaps greater moment, that requires to be mentioned; allowing the soil to be equally favourable to the growth of the whole plants, of which the mixture consists, there are certain plants which are highly inimical to the growth of others, when planted in their immediate vicinity; ivy and honey-facile for instance, when mixed with thorns, or other plants in a hedge, never fail to destroy such of the hedge-plants as they happen upon; indeed moat, which is known to be one of the worst enemies to all hedges, is not more dangerous, or more certainly ruinous; even the different kinds of sweet-briar, brambles, &c. have the same effect; and in the end never fail to produce a gap in that part of the hedge where they grow, by rubbing, corroding, and smothering the thorns or other plants of which the fence consists.

There is one plant that may, however, be employed in mixture with the white thorn, without any inconvenience of this nature, and with the advantage of rendering the hedge more formidable, as well as much more ornamental. This is the common holly. It thrives remarkably well in such combination where the soil is sufficiently dry, and not too heavy.

In what regards the second point, or the preparation of the soil for hedges, and even plantations, it is remarked that, though at present flamefully neglected, it is neither useless one of these points intimately connected with, indeed essential to, their success. Except in a very few infinences, however poor the soil may be, or however long the cultivation of its parts, no attempt is made either to break that cohesion by proper tillage, or improve its quality by enriching
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riching or alternative manures; the young plants being for
the most part laid upon the old surface, which has perhaps
never been opened by the labour of man, and their roots
covered with the earth taken out of the ditch, confining
very often of the poorest and coldest till, or of earths loaded
with iron, or other metallic impregnations. To those who
have considered the matter with the smallest attention, the
fate of such a hedge will not appear doubtful; the surface
upon which the plants are laid will be so hard and imper-
vious to the roots, as to preclude the possibility of their
penetrating it; of course their only chance of either extend-
ing themselves, or procuring nourishment, is by spreading
out between the surface and the mound made by the earth
taken out of the ditch, or by striking up into the mound,
where, though the foil will be sufficiently open to admit of
this, the roots, in place of finding an establishment in a situa-
tion friendly to their growth, will very often be either
flavoured or poisoned. In the culture of the grain, and the
whole of our most useful and valuable vegetables, proper
preparation of the foil by tillage and manure is, it is re-
marked, deemed indispensably necessary; and experience
has sufficiently evinced, that upon the perfection of the
tillage, and the quality and judicious application of the
manures, the success of the farmer or gardener, and the
value of their crops, entirely depend. Is it not strange
then, that the same farmer who is convinced of the utility
and necessity of tillage and manures for his other crops, and
who would think himself for ever disgraced, were he to fow
or plant grain, or any other useful vegetable upon an un-
ploughed, dirty, unmanured field, without flame or com-
position, commit a hedge, which is to form the in-
closure of the field, and upon which a considerable part of
its future improvement is to depend, to the earth without
any one of these aids? Incredible as it may appear, this is
however certainly the fact; unless, as has formerly been ob-
erved, in a few instances where better fence and stronger
observation have dictated a different management; it being
the uniform custom in most plans of improvement, be the
quality of the soil what it may, to mark off the line of the
fence, dig the ditch, and commit the hedge-plants to the
earth, without any previous preparation, either by tillage
or manures.

In every instance where a hedge is to be made, the ground
should, it is contended, be previously prepared by a complete
furrow fallow, in order to destroy the weeds; when this is
accomplished a certain proportion of dung, lime, or compost
should be laid on the tractor upon which the hedge is meant
to be planted; after this is done, and the manure properly
incorporated with the soil, a furrow should be drawn with
a common plough about the end of November; in this fur-
row the plants should be placed, and the earth, thus im-
pregnated with the dung or compost, drawn up to and trod
firmly about their roots. When the soil has been previously
cleared of weeds in this manner, and a sufficient quantity of
manure befallowed, the hedge, if the plants are healthy, and
suited to the foil and climate, may be committed to the
earth, with every prospect and chance of successful growth.

With regard to the third circumstance, or the time and
mode of planting, it is contended, that of whatever plants
the hedge is to be made, they ought always to be put into
the ground, either before winter, or very early in the spring,
before any vegetation takes place. In this way, if the
plants have been carefully taken out of the nursery ground,
and no material injury done to their roots by laceration,
pruning, or otherwise, their growth receives scarcely any
check, and they make more progress in one year, than they
would do in three or four years under different management.

The beginning of November, or any time during the month
of January, seems the most proper time for planting
thorns.

The holly, where it is made use of, must however have a
different treatment, and be planted out at a very different
season of the year, as upon these its successes and progres
seem wholly to depend. The proper time for transplant-
ing or removing this sort of plants is about the middle of
the winter season, as at this period they are found to
fearfully suffer any check from the operation. From the
want of knowledge of this fact numerous hedges of this
sort have failed; as, when removed during the winter months,
plants of this kind are almost certain to be destroyed; while,
under the contrary circumstances, they grow with certainty,
and in the most rapid manner. In putting them into the
foil, their root fibres should likewise be as little trimmed off
as possible, and the ground should not be in too moist a
state.

The mode of planting thorn, and other sorts of hedges of
that kind, differs in different places, and even in the same
place according to the nature of the hedge: when hedges
are made in the face of a ditch, bank, mound, or wall, the
universal practice is to lay the plants horizontally, either
upon the surface, or upon a paring of soil or earth taken
from it; and afterwards cover them in such a manner as that
about four or nine inches of their length shall be covered
with the soil, and about three inches left projecting with-
out it. In this way, sufficient room is left for the roots
stretching out and forming an establishment for the plant,
while the part left projecting is so short as not to be able to
produce above two, or at most three good shoots, which,
from the smallness of their number, will be vigorous and
useful; whereas, if a greater length had been left without
being covered, the shoots would have been more numerous
and of course weaker; the future value of the hedge
depending entirely on the number and strength of the first
shoots the plants make. We have already hinted at the
necessity of preparing the soil properly by tillage and ma-
nures; and in this mode of planting, namely, upon the plain
surface in the face of a ditch, bank, mound, or wall, it is
equally necessary as in any other; dung, lime, or compost,
ought to be laid upon the tractor, and pointed in with a spade,
and in place of laying the earth taken out of the ditch
indiscriminately upon the roots of the thorns, care ought
to be taken to cover them with the soil of the surface mould;
by such treatment, having a well prepared, unimpregnated,
bed below, and a covering of good earth above, the roots
of the plants have not only abundant room to spread, but
have also plenty of nourishment; this gives them a decided
advantage at their first starting, and enables them to make
more progress in two or three years than they would other-
wise do in twice that length of time. In the bank method
of planting, hedges, there is much variety in the heights
to which the banks are raised, but the proper height must prob-
able be directed by the nature of the soil and the situa-
tion. And besides the horizontal mode of laying in the plants
into the banks, there are other methods practised in particular
cases.

In respect to the manner of planting a hedge upon the
common surface it is very simple; a furrow, about eight or
nine inches deep, is made with a common plough upon the
tractor which has been previously limed and dunged; to render
the furrow as clean as possible, the plough should be drawn
twice along it; one labourer then goes along the furrow
with a bundle of plants under his arm, which he drops by
handfuls of six or eight together at certain distances; when
he has gone over perhaps a hundred yards in this manner,
he returns to the farther end, where he began to drop the plants; and, taking up the first handful, begins to set them in the bottom of the furrow, not in a direction perpendicular to the horizon, but inclining a few degrees in the same direction that the fence runs. The labourer places, leaning against the perpendicular side of the furrow, at the requisite distance from each other, as from four to six inches; having placed the whole of them in this manner, he covers them with the earth from the other side, or that which has been turned up by the plough: when this operation is finished, he sets a foot on each side of the hedge, and, beginning at one end of it, goes slowly along, treading the earth close to the roots of the plants the whole way; the soil is then pointed with a spade on each side, which finishes the operation. Where the necessary pains have previously been taken to pulverize the soil, a single labourer will, with great ease and exactness, plant several hundred yards of thorns or other hedge-plants in the course of one day.

Another method consists in one labouring man receiving the plants, by two or three at a time, from another, who carries a bundle of them, setting them in the middle of the furrow, with the top reching a little, and drawing a quantity of earth from each side with his foot to cover the roots; when about fifty or a hundred yards are completed in this way, each labourer takes a common garden rake; and draws up a sufficient quantity of earth to each side of the plants; treading the surface with their feet, as they go along, in such a manner as to bind the soil moderately, and at the same time set the plants in a straight line.

And a third mode of practice consists in lowering the tract or line of the hedge, or taking it with a garden rake, then stretching a line along it, laying out a furrow with the spade, and afterwards planting the thorns or other plants, and laying the earth to them in the manner described in the above methods. The laying out a furrow with the spade in this way admits of the work being done with great neatness and accuracy; but it is attended with considerably more labour and expense, and, after all, appears to polish no great superiority over planting with the plough. In some cases the hedge is planted with the dibble, but it will be seen below that this practice must be an improper one; for if the plants be the whole of their roots preferred, and are planted with a dibble, instead of the fibres being properly spread out, as they always ought to be, they will be crammed together into a narrow space, with their points flaring upwards; or, in other words, looking out of the soil, in place of dipping into it; or, if by much pruning they are cut too close as to be made fit for going into the dibble hole in an easy manner, their growth will unfail a very severe check by such injudicious pruning. In considering hedges as forming the constituent parts of compound fences, the circumstances connected with the planting of each will be more fully described and pointed out.

In regard to the height of growth or age at which hedge-plants may be used with the greatest advantage and propriety, it may be observed that it is extremely common, particularly where young hedges are made with quicksets, to plant them out at one, two, or three years old, but seldom exceeding this late age. Plants of this sort, when put into the earth at a proper season of the year, upon a line of fence which has been prepared in a proper manner, and which are afterwards kept clean by a careful attention, and the earth firm and loamy, by regular weeding and digging, seldom fail to form good fences; such young plants are, however, it is suggested by some, long in a state of infancy, and require great nursing, and the most complete protection to bring them to perfection, and are liable to be either much hurt, or totally destroyed by many accidents that would produce little or no effect upon older and stronger plants. It is the opinion of many sensible and well-informed people, that much time might be saved in the rearing of hedges, and the fences be much more perfect and useful, if older plants were employed for that purpose. Three years old is certainly the youngest height that should be planted, and if they are even five or seven years old, so much the better: the prevailing idea that plants of this age will not thrive if transplanted, is, it is said, totally unfounded: as, with proper care, they not only grow readily, but make excellent fences in one half of the time that younger plants usually do, with this additional advantage, that they are more liable to be killed or injured by frost, drought, weeds, or the other causes that affect younger plants. Thorns of five or seven years old, in place of being no thicker than a common straw, will be at a medium more than an inch in circumference; we leave those who are judges to determine how far a plant of this last description will be superior to one of two years old, and how much sooner it will answer the purpose of a fence. It is, however, very material to observe that, where plants of this age and size are used, the most complete care should be taken to preserve the roots as entire as possible. The degree of pruning which may be necessary before planting will be mentioned afterwards. In respect to the size of thorns, or other hedge-plants, it may be necessary to observe, that, when the plants are once obtained, they should be separated into lots, according to their sizes and apparent strength, picking out the largest first, and so on downwards. This will be attended with several very material advantages, which those who have made observations on the subject will very readily understand: plants of the same size and strength, when planted together, keep pace with each other; no one of them takes from the earth more than its own share of nourishment, of course, the growth of the whole is regular and uniform, and the hedge, when arrived at a certain age, becomes a substantial efficient fence of an equal height throughout, and free of any gaps; whereas, when no pains have been taken in assorting the plants, and they are planted promiscuously, great and small, strong and weak, the consequence is, that the stronger plants very soon outgrow such as are weaker, and not only overtop them, but also deprive them of that nourishment which they so much require, as the hedge advances in age the evil becomes greater, smaller flunted plants, and innumerable gaps appearing throughout the whole line of the fence, these are intermixed with others remarkable for their strength and luxuriance, the whole conveying to the mind not the most dilient idea of utility. And the worst part of it is that, when hedges have been thus neglected in the beginning, no pains or industry on the part of the farmer will be sufficient to render them useful afterwards: there being nothing more difficult than of repairing the defects of a hedge, after the third or fourth year of its growth. This assorting of hedge-plants has, it is contended, a farther advantage: namely, that of putting it in the power of the person who plants the hedge to put down the large, strong, healthy plants upon the poorest part of the line of the fence, and to let such as are smaller and weaker upon the richer and more fertile parts. He has it also in his power, by a more careful preparation of the soil, and by following a greater portion of manure upon the spaces where the small plants are set, to give them that nourishment and alliance which they require, and which would very soon enable them to form a fence equal to that part occupied by the strongest plants that have been employed.

With regard to the dressing and pruning of hedge-plants before
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before they are put into the earth, there is perhaps no part of the system of managing them, or forest-trees, more hurtful and defective than that now pursued in the common nurseries. It is a very common practice with nurserymen in the spring, when they wish to clear their ground for other purposes, to take up great quantities of thorns and other hedge-plants, and after pruning the tops, and cutting off nearly the whole of the roots, to tie them up in bundles, and lay these bundles in heaps till they are called for. In that mutilated state they often remain for many weeks, with the mangled roots naked and unprotected, exposed to every inclemency of the weather before they are sold. The consequence is obvious; the severe pruning, by curtailing the number of the roots, and depriving the plants of the means of drawing their nourishment from the earth, would of itself prove an effectual check to their future growth, even if they were planted immediately after this severe trimming; but by being allowed to remain so long exposed to the weather afterwards, the tender fibrous extremities of the remaining roots are most of them destroyed, and when the plants are then put to use, they are not only half dead, by being so long exposed above ground, but are, as it were, inflated, and their connection with the earth cut off by the severe pruning and destruction of their roots. Under these unfavourable circumstances they must remain in the ground till new roots are produced, during which period they suffer a total want of nourishment, and if the soil be dry and much warm dry weather follows the planting of the hedge, many of the plants will perish before they are capable of putting out and producing a number of new roots sufficient for their support. Accordingly, many of them fail from these causes, and numbers of hedges which, under different management and with small trouble, would soon have been complete fences, are full of gaps, and remain for ever after in an imperfect state. When thorns or other hedge-plants are thus leverely handled, and their roots and tops so mercilessly cut off, they render cuttings more than plants, and must remain a very long time in the earth before they are capable of sending out new roots, or drawing from it a quantity of nourishment adequate to their support. Were nurserymen and others, who raise these plants, to bow to the smallest attention upon the subject, common sense would dictate a very opposite treatment. Men of observation know, that in every instance when the roots of herbaceous plants are to be transplanted, the more carefully they are taken out of the ground the more numerous and entire their roots, and the sooner they are again put into the earth, the less check will they receive, and the quicker and stronger will they afterwards grow. If these observations are just, how faulty and defective must the system we have just now described appear! Indeed nothing can be more repugnant to nature and common sense than to suppose, that when plants of any description are removed from the situation in which they are growing, and sent to fresh a new establishment in a different soil, and perhaps a worse climate, they will thrive better by having their roots cut off, and being almost entirely bereft of the means of obtaining nourishment. With equal probability might success be expected from planting a colony with people, after having completely mutilated them by cutting off their hands, putting out their eyes, &c. In place of this treatment, the defects of which are so obvious, and the consequences resulting from it so hurtful, no hedge-plants should be lifted out of the nursery-ground till the day on which they are to be re-planted; and instead of digging them with a spade, by which they are often much injured, they should be taken up with dung-forks with long round prongs, taking care to disengage the roots carefully from the soil; and, in place of the severe pruning and dressing already mentioned, every root, even to the smallest fibre, should be carefully preferred, and the use of the knife confined entirely to the necessary curtailling of the tops. Where this care is taken, and the plants are put into the ground at a proper season, they will suffer no kind of check, and when the spring arrives grow luxuriantly and with a vigour much greater than is commonly the case.

It may be farther observed, that much of the benefit arising from an attention to the foregoing circumstances will depend upon the after management of the hedge. Complete weeding, loosening, and laying new earth to the roots for the first three or four years, are indispensably requisite; for whatever pains may have been previously taken in dunging and summer-fallowing the soil, unless it is properly attended to, and kept clean afterwards, this dunging and summer-fallowing, in place of being useful, will prove hurtful to the fence; as the manure and tilage, by enriching and opening the soil, will encourage and promote the growth of weeds, which, under circumstances so peculiarly fortunate, will become so luxuriant as either to deluge or materially injure the growth of the hedge, unless they are kept down by frequent and complete cleanings. These weedicings are of two kinds, and ought to be conducted in two different ways. If the weeds are principally annuals, a flight scuffle with a hoe will be perfectly sufficient, and this to be repeated as often as a new crop of weeds appears; but when the weeds in place of annuals are composed of root-weeds, or, in other words, of perennial or biennial plants, the extirpation of these last will be attended with more trouble. With weeds of this description scuffling will not answer, as though the tops may be cut off by that operation, the roots remain, and not only furnish repeated crops of the same weeds, but also rob the hedge of its proper nourishment. In place, therefore, of scuffling and cutting off the tops of such weeds with a hoe, the ground ought to be carefully dug with a dung-fork, of the kind already described for lifting thorns. An instrument of this sort is preferable to a spade, as it cuts none of the roots of the hedge, loosens the ground sufficiently, and at the same time admits of the weeds being readily and easily picked out. The first weeding of this kind that is given to a young hedge should be early in the spring, when, if it is completely done, there will be little occasion for any farther trouble during the season. Cleaning at that period has a farther advantage, namely, that of loosening the soil at the exact time when the roots are beginning to spread and extend themselves; whereas, when it is delayed till the summer, the weeds have attained a considerableness; size, have deprived the hedge of much nourishment, and the opening of the soil then exposes the roots of the hedge to the parching heat of the summer sun. In the cleaning of young hedges, especially such as are situated in the face of a ditch or bank, it is the universal custom for the labourer to skim off the surface with a spade, and let it fall into the bottom of the ditch. This operation, though it gives the hedge an appearance of cleanliness, is attended with some very considerable disadvantages; repeated parings of this kind, in the face of a ditch or bank, in a few years waste the front to such a degree that the hedge, which after frosts or other weather is apt to fade and tumble down; the paring-off and throwing into the bottom of the ditch so much earth, together with the roots and weeds it contains, very soon chocks and fills it up.

Notice will afterwards be taken of the necessity of constructing hedge-fences in such a way as that the hedge shall not project immediately from the front, but shall be placed upon
upon a shelf, or what is termed a 'farrowment,' of not less than twelve or fourteen inches broad. By such management the hedge will be high and dense, without the risk whatever of being undermined by the earth falling into the ditch, and may be kept clean with as much ease as a common garden-border. The proper method of cleaning a hedge, planted in this manner, seems to be that of digging the border with a short-pronged fork in the spring, picking out such of the weeds as can be readily taken up by the hand, and afterwards raking it with a garden-rake: this last operation, along with its making the surface smooth, and giving the work a finished look, will also bring out a great number of the smalled roots that had escaped the labourer's notice in digging it with the fork. Some imagine that by a flight weeding once or twice a year for the first two or three years after the hedge is planted, they do all that is requisite; this, however, is a mistake; for though a hedge may, by care and attention for the first five years of its growth, attain such a height as will prevent it from being smothered by the weeds, still it will suffer much injury from them, not simply by the nourishment they take from the hedge, though that must be considerable, but by the effect they have upon the lateral branches near the root, many of which they kill, and by that means render the fence open and naked at the bottom. Skilful hedges are well acquainted with this circumstance, and very properly consider annual clearings and loosening the soil about the roots as equally necessary to the welfare of the hedge as the other operations of switching, pruning, &c. &c. The apparent trouble and expense of cleaning every description of hedge yearly will do doubt present a formidable obstacle to the practice; but, when properly considered, this labour and expense will be found more apparent than real; for if a proper weeding has been given when the hedge was first planted, and the earth well opened, the only trouble required afterwards will consist in giving the ground on each side of the hedge a flight scuffle with a hoe, a work at which a labourer will be able to do a very great deal in the course of a day.

To this practice of keeping hedges clean with a view to promote their growth, is to be added another motive, of equal, indeed of superior, moment; round most of the inclosed fields in Britain, the space occupied by the fence is considerable; and as no part of this space is under the plough, it is left to produce such plants as nature or accident may have brought into the soil; these, by being suffered to grow, and their seeds to ripen yearly, are wafted by the wind into the adjoining fields, where they multiply beyond conception, and create an endless trouble to the occupier, rendering abortive a great part of the labour and expense incurred in fencing. A person who is sensible of the advantage arising from the extirpation of weeds of every description, either in the fields or their immediate vicinity, must feel a considerable degree of pain to observe, about the end of summer, the clouds of the winged or beard ed kind rising from the side of every hedge or highway with the slighest breeze of wind, and scattering themselves over the adjoining fields, which have been perhaps four years before at a heavy expense; the evil is undoubtedly great, and affects the innocent as well as the guilty, it being no uncommon thing for the best farmers to have their fields rendered foul by the wind blowing the weeds of their flothful dirty neighbours upon them. The remedy is easy: let every farmer be obliged to cut down the weeds round the whole line of his fences, to early in the season as to prevent them from running to seed; and let the trustees of every county, in making contracts for the repair of the public roads, bind the contractors to cut down the weeds annually. The labour of these operations will be very trifling, and their benefit to the public scarcely to be calculated.

It may be remarked, that in loosening the earth about the roots of hedges, whether old or young, it will be of advantage, if there is soil enough to admit of it, to lay up a few inches of it to the roots; doing this frequently encourages them to push out branches near the bottom, which prevent them from growing thin and open, a fault to which almost all hedges are liable, if due pains are not taken to prevent it. When a hedge has been planted in the face of a ditch, bank, or mound, with a projecting space or fence before it of sufficient breadth, a supply of new earth may be laid up to the roots every two or three years, from the sediment let fall by the water in the bottom of the ditch; this sediment is in general the richest of all soils; and as it is necessary to remove it from the bottom of the ditch, for the purpose of cleaning the water course, employing it in this way not only saves the trouble of carrying it elsewhere, but promotes the growth of the hedge, and gives the fence a much more finished look. Upon the sides of highways the same thing may be done with advantage, not only to the hedge, but the road also; for though there may be no ditch to require cleaning, yet as most of the highways in Britain have a greater or less declivity towards the sides, the decayed materials of which the road is made, together with the horse dung and other matters dropped upon it, are washed down from the top to the sides, where they accumulate in considerable quantities; shovelling this carefully up, and laying it to the roots of the hedge, afford the plants at once protection and nourishment. Where hedges are planted upon the plane surface, the earth can be laid up to the roots with great ease; and at each cleaning it certainly should be done. The trouble of doing it is trifling, the advantage very considerable in many points of view.

In speaking of the pruning and after-management of hedges, it is observed, that though a strict attention to the foregoing circumstances, during the infancy of the hedge, is highly necessary to produce healthy vigorous plants, a very considerable part of its beauty and future value will depend upon these being properly performed.

It may be remarked, that there is, perhaps, no part of the subject upon which a greater contrariety of opinion at present prevails, than the age at which the pruning of hedges ought to commence, the manner of that pruning, or the season of the year at which it may be given with the greatest possible advantage, and the least risk; the practice with some is to prune from the first year, not only the lateral branches, but the tops also; and they give as a reason, that cutting off the extremities of the shoots contributes to the thickening of the hedge, by making them pull out a great number of new ones. The fallacy of this argument, and the mischief with which the practice is attended, we shall have occasion to notice afterwards. As to the manner of pruning, or the form of the hedge, these seem with many to be matters of indifference, no attention being paid to directing them in such a way as to have them broad at bottom, and tapering gradually towards the top; many of them being not only of one width from top to bottom; and not a few much heavier and broader above than below, it is obvious that such hedges can neither look well nor be useful.

The reason at which they are trimmed is, in many instances, it may be observed, an improper one; for in place of choosing that time when the plants are least in danger of suffering from an effusion of their juices, which is either at a late period in the autumn, or very early in the spring, the pruning is given in the summer season, when vegetation is in its
its prime, and the plants are full of juice: the check and
injury they must receive, from having the whole of their
extremities cut off at that period may safely be con-
ceived.
When speaking of the treatment of hedge-plants before
they are put into the ground, notice has been taken of the
neceffity of preferring the roots as much as possible, and at
the same time shortening the tops: this latter operation has
two good effects: for by curtailing the top and branches
the roots have left to nourish; and by leaving only two or
three inches of the top above ground, in place of growing
up with a single stem, it leaves out two or three; and as
these strike out from the plant so near the earth, each of
them has the same effect, and strengthens the hedge as
much as the original stem would have done by itself; with
this addition, that in place of one prop or support, the
hedge will have three or four. After this first pruning,
however, no hedge should be touched, or at least very
gently, for some years: from an inattention to this cir-
cumstance, and the injudicious application of the knife or
scalpers at an early period, many young hedges are rendered
wilted, which, under different treatment, would have made
excellent fences, with one-half the trouble that was re-
quired to destroy them. The practice of cutting over the
tops yearly, which is done with a view to render theedges
thicker and more perfect, is one of those mistakes which
one would naturally have supposed common to all, and ob-
find one in many instances in the course of time, and un-
attended, in which hedges of great value, without any
wholesale loss, have been cut down as muck a number as
the leaves, or branches, with which they are covered, can
be cut; a practice of the same kind has been pursued
in the case of the hedge-fence, where the slabs are cut
down, and the branches exposed, in the cutting of their
thick fences, by thereby exposing the whole to injury, and
rendering them liable to break through them. A hedges-fence trimmed in this way is re-
presented at fig. 10. in the plate to which we have referred.

Cutting over old live hedges.—With respect to the cutting
down of old hedges, the above directions and observations
apply, it may be observed, with strict propriety, only to
such as have been regularly attended to from the time of
their being planted: as there is, however, immeasurable
hedges in the kingdom, which, by being neglected, have
grown up to a great height, have become open and naked
below, and bushy and unmanageable at top; it is of con-
fquence to point out the means of reducing such hedges to
a moderate state, and rendering them useful. This pur-
pose, it may be, can only be effected by cutting them
down, and procuring from their flanks a growth of new
shoots, which, with proper management, will soon make a
perfect fence. If the hedges inclosed by such hedges are al-
ternately in pasture and tillage, the period most proper for
cutting them down is when the field is to be ploughed.
Under a corn crop the confinement of the flock is no longer
an object; and by the time the field is again brought under
the plough, the hedge, if properly treated, will have ac-
quired strength enough to become a good fence.

This operation is performed in several different ways;
in the first the hedge is cut over, about a yard above the
surface, and is left in that state without any other pains
being taken with it; if it has originally been good, and
the plants thick enough at bottom, this kind of cutting
will answer the purpose perfectly well, and in a few years
the hedge will, with proper drilling, become both a neat
and comfortable fence. A hedge cut over in this way, with
one year's growth of new shoots upon it, is represented at
fig. 11. in the plate.

However, in this mode, when there has been a deficiency
of plants, and the hedge is cut over in the manner above
mentioned, immeasurable gaps will appear, which, without
some art, it will be impossible to fill up. It has also this
farther disadvantage, that if either horses or cattle attempt
to leap into, or out of, the inclosure, the sharp points of
the stakes are apt to run into their bellies; this, accord-
ingly, often happens, and many valuable horses and cattle
are killed, or greatly injured by such means.

Another, and indeed a preferable mode of cutting down
old hedges, is, to cut a fourth part of the plants over, to
the height which the fence is intended to be made, and
by no trouble, and the remaining three-fourths with
these upright stems. This method very effectually cures
the gaps and openings below, and, with slight attention, soon
makes a good fence. At fig. 12. is a representation of a
hedge done in this method of cutting.

And a third way of cutting old hedges, is that of
taking them off close by the surface: this practice, when
the plants are numerous, and there are no gaps in the hedge,
answers very well; but, when there is a deficiency of plants,
in any part of the hedge, the want will be very apparent. This last mode, though much inferior to the one im-
mediately preceding, is nevertheless greatly preferable to
that first described, as the young shoots sent out from
the stumps, by being near the ground, will in some mea-
sure remedy the defects occasioned by the want of original
plants, whereas, when the old plants are cut at the dif-
fance of about a yard, or four feet above the surface, the young
shoots produced by the cutting will be too high, as to leave
the hedge open at the bottom, and very thin.

There is another method of cutting down old hedges;
but which is yet but very little practiced, which is first to
cut them down even with the surface of the bank, &c.
and afterwards to cover the stumps completely over with the
earth taken out of the ditch, or from the road side.
When this is carefully done, it is asserted that every single
root sends out a great number of young vigorous shoots,
each of which, by branching out from the stump below the
surface, sends out roots, and acquires an establishment for
itself: by this means, the bottom of the hedge becomes so
thick, that neither sheep, cattle, nor indeed any animal, can
break through it.

In which-ever of these ways the hedge is cut down, the
directions formerly given for the management of young
hedges should be strictly attended to, as long as the young
shoots have made some progress; the side branches should
be trimmed, and the hedge put into a proper shape, pref-
serving it broad and full at bottom, and tapering gradually
towards the top, as shown above. The fence caution is also
to be observed with regard to the upright shoots, none of
which should be shortened till the hedge has attained the
wished-for height. It is surprising what close beautiful
fences are raised in this way, in a few years, from the stumps
of some over-grown useless hedges; which, at the same time
with their being naked below, and of course faulty as fences,
occupied four times the space they ought to have done, to
the great loss both of the proprietor and farmer.

The observations formerly made with regard to the pro-
per season for pruning and switching young hedges apply
with equal, indeed greater propriety to the cutting down of
old ones; as, if this operation is done at an improper season,
from the lagenecis of the stumps, the extent of wounded
surface exposed to the weather, and other circumstances,
the plants are in imminent danger of being destroyed; in-
deed this very often happens when, through ignorance or in-
attention, the proprietors of hedges have them ploughed
and cut over during summer. It is unnecessary in this instance
to enter into any digression as to the use of leaves and branches
to plants of every description; it is sufficient for the present
purpose to state what experience and common feule have
abundantly proved, viz. that the loss of either, especially
when the plants are in a growing state, and the juice circu-
lating through them, is in most cases attended with the de-
struction of the plant; indeed the thing speaks for itself;
the juice of the plant, instead of being employed in nourish-
ing the top and branches, flows in great abundance through the
seckion of the trunk, and by finding its ready exit, draws from the root a quantity of nourishment, far exceed-
ing the proportion required for its former support; by such an
unusual drain, the plants are exhausted, or, as is com-
monly said, they bleed to death. It is to be observed, how-
ever, that every description of plants is not equally affected by
a summer cutting;those that are most juicy and succulent,
and have the largest circulating vessels, always suffering more
than such as are of a harder texture, have smaller pores, and
lefs sap circulating through them. The birch, larch, pop-
pula, willow, and, in general, all plants that contain a large
proportion, either of resinous or fæceurine matter, are to be
racked in the full clas; the different kinds of thorn, crabs,
&c. &c. belonging to the second; the former are almost in-
sidally killed by a spring or summer pruning; while the
fame operation is often practised upon the latter with lit-
tle apparent injury. But though we thus readily admit that
one description of plants will survive an operation by
which others would be killed, it by no means follows that
they are not injured thereby; there are, indeed, too many
proofs to the contrary, as in almost every county there are
thorn-hedges met with, that have been ploughed or cut over
in summer; and which, though they have not died in con-
sequence of the operation, yet, by the loss of juices, and the
exposure of their naked trunks and wounded extremities to
the parching rays of a summer sun, have been so much weakened,
as to prevent them from putting out new shoots, and
have ever afterwards remained in a naked state, exhibiting
an appearance no way better than that of a dead-hedge.
This picture is the very reverse of what, under different
 treatment, would have been the case; as when the old plants
are cut over at a proper season, a healthy luxuriant crop of
young shoots never fails to be produced.

The proper season for cutting over hedges is either at a
late period in the autumn, or very early in the spring; at
both of these periods the plants are equally safe from injury;
at the former, the juices in the cutting ready to pour out in
the spring they have not begun to rise. In either case, no danger whatever can arise from the bleeding of the
plants, as, long before the circulation takes place, the
wounds occasioned by the cutting will be completely healed;
all cuttings or trimmings ought therefore to be done at one
or other of these periods. The same remarks also apply to
the modes of cutting over and repairing fences mentioned
below.

Plowing hedges.—There is a practice in many of the Eng-
lisli counties, which is common in respect to fences; that of,
after the plants have attained the wished-for height, cutting
their stems about half through, within a few inches of the
bottom; then bending them a little down, all in one direction,
and binding them together atop with willows, as represented
fig. 3. in the second plate on fences. This, when properly exe-
cuted, forms a very pretty neat looking fence, but is liable
to several objections. By the cutting of the plants so near the
root, unless great pains are taken, there is a chance of cut-
ting them too much; indeed, in some instances, they are cut
through, altering thereby the value of the hedges by this great
lesioned, and gaps appear in many parts of it. The binding
at top being of dead wood soon decays; and the plants
either rise up, if they have not been very much cut, or if the
cutting has been deep, they are apt to be blown to one side,
and even broken over by the wind. Owing to these
causes many hedges, where the plants are sufficiently nu-
erous and healthy, and which, with little trouble, would
have formed beautiful and useful fences in a short time, have
their value impaired, and are rendered faulty and defective.
Cutting the stem too much subjects them to another evil,
namely, the mischief arising from heavy falls of snow, by
which, when the quantity is considerable, especially if there
is a high wind to accumulate it about the hedge, it is there-
by pressed down, and many of the plants break entirely
over.

The practice noticed above, of cutting one-third of the
stems over, at the height of about four feet from the sur-
fice, leaving some as standards, and warping them with the
others that have been left of the full length, makes a much
stronger fence, and one that is less liable to injury, either
from the attempts of cattle, or from the wind, or heavy
fall
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The making of this sort of hedge fence is a matter which requires great exactness and judgment in order to perform it in a proper manner. It is, however, mostly done by those who are in a great measure ignorant of its nature, often cutting the plants in a downward direction instead of an upward one, by which they are exposed to speedy decay and destruction. Where the work of plating is well executed, the cuts formed for the laying down of the plants should not be made in the manner shown at Fig. 13, in the first plate on fences; but as is represented in Fig. 14.

In the execution of this business, it is very material that the operator be furnished with a hedge-bill which is perfectly sharp, as the neatness of the work depends greatly on this circumstance. The old flabby parts of the hedge should be cut off as low as it may be covered with the mould from the ditches in the after cleansings of them, and the layers, or parts laid down, should not have more connection with the old stumps than is barely sufficient to convey the sap juice in due proportion to the plaites, or layers. In this way the stumps soon throw out plenty of young shoots for a new hedge, the layers being merely designed to serve that purpose until the young wood gets up again. The most healthy and bold plants should always be selected for the plaites, and those designed for stumps should not be too large; the size of a strong walking stick is quite sufficient, as they increase fast. It is the practice of some drillets to lay the plaites high, while in others they are laid down very low. Both these extremes are attended with disadvantages, as by the first too much sap juice rises into the plaites for the due support of the bottom shoots, by which they become weak and trifling, the hedge being of course left thin where the contrary should have been the case; and by the latter the hedge is left too low, and consequently more liable to injuries from cropping with cattle, &c. : the middle course of course should be pursued. After the layers, or plaites, are interwoven with the stumps, and the superfluous twigs of the hedge dried off by the bill, some nick the layers in different places at the distances of about a foot, by which it is supposed more branches, or shoots, are thrown out from between the stumps, or cuts, as the sap juice rises more slowly.

It is of great advantage to the rising of the hedges in these cases to have the inclines under the plough for two or three years, after they have been platted.

This system of making fences should be more generally practiced in those districts where it is yet but little known, by having labourers from those where it has been long in use, as by it the farmer must derive considerable advantage in having hedges which are chiefly formed of living materials instead of such as are dead, and consequently on the constant decay.

In most places the wood which is thinned out in forming such fences, will amply repay the expenses which are incurred in making them.

A hedge platted in the proper manner is shown at Fig. 15, in the plate. It should be at all times kept in order. I am unable to give the exact operation of the above kind, in which old hedges are either cut over or platted, and bent down so as to constitute a fence, the ground on each side should, as soon as circumstances will admit of it, be completely dug over, cleared of weeds, and the earth laid up to the roots of the plants. It is truly surprising what numerous and luxuriant shoots the stump send out when managed in this way: while, on the contrary, when these necessary operations are neglected, fewer shoots proceed from the old trunks; and of these few a considerable proportion is choked and destroyed by

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the weeds and other rubbish in the bottom of the hedge-bank.

Filling up gaps in hedges.—In respect to filling up gaps in young hedges, it may be remarked, that when young hedges are planted, if the plants made use of are of a nature suited to the soil, the hedge may be kept free of gaps with very little trouble; for this purpose it is, however, necessary, about the end of the first autumn, after the hedge has been planted, to examine it carefully throughout its whole extent, and to take out such plants as are either sickly, dead, and fill up the spaces thus left with the strongest and most vigorous ones that can be found: where this care is taken for the first two or three years, there will be no defects in the hedge, which will be uniformly thick and strong throughout.

But when old hedges are meant to be cut down, that have many gaps or open spaces in them, so wide as to prevent the possibility of the young shoots filling them up, some expedient must be had recourse to, in order to render the fence complete. This purpose may, it is supposed, be answered in different ways: the easiest, and indeed the most common method is, for the hedger, when he comes to a place where any of the plants are wanting, to take one of the strongest plants next to it, and after giving it a gentle stroke with the hedge-bill, to bend it across the opening, and entwine its branches with the thorns on the opposite side; indeed, as has been already stated, some have a custom of cutting down only a fourth part of the hedges, in warping the remainder with these, which appear like flakes driven into the earth. Where the hedge is shortened to within three or four feet of the ground, both of these planting methods answer pretty well, and the openings which would otherwise have been left, are in some degree filled up; but when the old hedge is cut close to the earth, other methods of supplying the defects become necessary.

One very simple, and at the same time very effectual mode, consists in full digging the ground pretty deep with a spade, and taking one of the strongest plants on each side of the opening, that have been purposely left uncut, removing the earth from their roots so much as to loosen them, and admit of their being bent down, and laid close to the earth in the opening, as represented at fig. 16, in the plate. They should then be fastened down with wooden hooks, or pins, and entirely covered throughout the whole of their length with earth. Where this plan is properly executed, the plants so laid down send up a great number of young shoots, which very soon fill up the vacancy: when it is practised upon a hedge that is cut over close by the farmer, no other care is requisite; but where it is done with hedges that are cut at three or four feet above it, there will be a necessity for placing a temporary paling in the gap, to protect the young shoots from injury, till they acquire a sufficient degree of strength, as represented at fig. 1, Plate XIX.

It may be remarked that there is scarcely any thing attempted by farmers in which they are so unsuccessful as in the mending of hedges: in some cafes the defect is attempted to be supplied with young plants, which, from want of attention, very seldom succeed, as they are not only shaded by the strong old plants on each side, but are also deprived of their nourishment, by their roots spreading into the vacant space. To render an attempt to mend the defects of an old hedge with young plants successful, two things are absolutely necessary: the first is, that the whole of the roots of the old plants, which extend themselves into the opening, be entirely cut off; the next, that the hedge shall be cut down close to the earth, for at least a yard or more on each side of it. By cutting away the roots which extend themselves into the opening, the young plants are prevented from being robbed of their nourishment, and cutting down the old ones, for a little distance on each side, keeps them from being shaded, and allows them to enjoy the full benefit of the light and air; cutting down so much of the old hedge, no doubt, renders the opening larger, and of course requires more railing or paling to supply the defect; but this extra expense will be more than compensated by the success with which it will be attended. In many instances these vacancies are filled up with dead wood; indeed it is a common practice, after a hedge is cleared, to cram the greatest part of the prunings into these spaces, and under the bottom of the hedge, where it is any way open or naked. The most persevering imagination, it is said, could hardly suppose any thing more absurd; for if it be the wish of the owner that the plants on each side should send cut new branches to fill up the openings, the purpose is completely defeated by cramming them full of dead brush-wood, which not only prevents the extension of the branches, but from the violence and injury that is committed in thrashing in dead thorns, the plants are often materially hurt; and when this brush-wood decays, the opening, in place of being diminished, is considerably enlarged: the mischief is the same where they are thrush under the hedge, the practice of which, when continued, never fails to render it naked at bottom.

The use of fences for mending hedges is equally absurd and pernicious: where dead wood is used in the way above-mentioned, the hedge, instead of being improved, is made worse. The utmost that can be said of fences is, that though they do no additional harm, the hedge is not bettered by them; and from the opening being filled up in that way, the defect is perpetuated, and both the usefulness and beauty of the fence are impaired.

In some instances where the attempt has been made, the defects of grown-up hedges have been very completely, and indeed almost immediately, repaired, by planting strong beeches in the openings; these should be at least six or seven feet in height, and should be supported by a couple of pieces of coarse raking put across the opening. If planted early in the winter, they suffer no check whatever, and grow so vigorously in the spring as to fill up the vacancy the first season, as represented at fig. 2, in the same plate.

And the ground in this, as indeed in every other case where young plants are used, should be well dug, and enriched either with dung or compost; the plants should be the healthiest and strongest that can be procured, and the whole of their roots as carefully preferred as possible, as very much depends upon proper attention in these respects.

Disdeats of hedge-plants.—With regard to the disfigures of hedge-plants, it is supposed that the principal one to which they (especially thorns) are liable, is being covered with mofs, which, when it arrives at any considerable height, gradually destroys them. Upon certain soils, such as till or cold wet clay, it may be remarked, woody plants of every description are subject to this malady; and as it is evidently owing to the nature of the soil, it becomes a matter of importance to be able to apply a proper remedy. Linseed well known to be unfriendly to the growth of every description of moss, and in every instance where it is applied the mofs disappears. This circumstance, once known, furnishes a cheap and effectual remedy, both for preventing the disfigre upon young hedges, and curing it upon such as are grown up. If the
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Hints formerly thrown out with regard to the preparation of the soil before a young hedge is planted are properly attended to, and a sufficient quantity of lime incorporated with the earth, let the former quality of the soil be what it may, its nature will be so much altered as effectually to secure the hedge from every risk of being hurt by moths. The same remedy may be applied with equal success to old hedges, that are over-run with this vegetable vermin, and in which, though there may be plants enough in the ground, yet they are of no value, from the want of branches. To recover such hedges, and render them afterwards good fences, they should be cut down close to the surface, cleared completely of weeds, and the earth well dug for at least half a yard on each side of the roots. After this operation, which should be done about the end of autumn, the spaces so dug should be well limed upon the surface; it should be suffered to remain in that state during the winter, and early in the spring dug again, and the lime pointed in and incorporated with the soil. In the cafes where this has been done, the plants have sent out a number of useful vigorous shoots, which soon made good hedges, and no moths has afterwards appeared. It is from these experiments to be presumed, and it is hoped experience will confirm the idea, that in every cafe where either trees or hedge-plants are infested with moths, the use of lime, in the way here pointed out, will prove a sufficient remedy for the evil.

Compound hedge-fences.—These are such hedges as do not wholly of themselves constitute or form perfect fences, but which have the addition of some other fort to render them complete.

Single hedge and ditch.—This is a sort of fence that may either have a railing, palings, or some other defence added to it, or be wholly without them, according to the particular circumstances of the cafe. And it is a description of fence in which the ditch is of very different dimensions according to the nature and circumstances of it; the thorns being, for the most part, as Mr. Sommerville has observed, placed upon the common surface, upon what is termed a cairncment, or projection of six or seven inches, on which they lean, and which serves as a kind of bed, when they are cleared. By placing the plants thus far back from the edge of the ditch, they are in a great measure secured against the accidents to which they would otherwise be liable, if they were placed immediately in the front of the bank; as there are few ditches, however carefully they may have been made, into which the earth does not afterwards slide and fall in. In cafes, therefore, where the thorns are planted immediately in the face, or what is termed the brow of the ditch, if any portion of the earth falls in, it either carries the plants along with it, or deprives them of their nourishment; whereas, by placing them at the distance of six or eight inches back from the front, there is no risk whatever of their being injured by the earth falling down. It appears also, that the space commonly allowed for a cairncment is by far too little, being seldom more than four inches. In place of which it ought never to be less than twelve or fourteen inches. This would have several advantages, as it would not only prevent all risk of the earth tumbling in, and bringing the plants along with it, but would at the same time afford ample room for weeding the hedge completely, and drawing up the earth to the roots of the plants. There are matters of considerable importance, and which, along with their destroying weeds, promote the growth of the hedge, by affording sufficient passage for the plants, and enabling them to resist the effects of drought, frost, &c. much more completely than they would have been able to do if planted directly in the face of the ditch. It is common to lay the hedge-plants upon the plane surface, without any preparation whatever. But in other cafes, the first spadeful that is taken out of the ditch is laid on the front, and the plants placed above it; whatever the soil or situation may be, it is of importance to place the plants upon a bed of good, rich, well prepared earth, capable of affording them not only a due degree of nourishment, but into which their roots may strike with the utmost ease. Upon a very dry soil, and in elevated situations, it is sometimes necessary to place the hedge-plants considerably below the common surface, to prevent them from suffring by drought; where this is practised, the ditch is first dug of the ordinary dimensions, and the earth that is taken out of it laid about twenty inches back from the hedge; the labourer then, with a spade, cuts down a space about fifteen inches broad, and ten or twelve inches deep, along the whole front of the ditch; this space, when cut, resembles a shed: an inch or two of the bank would, well broke down, and pulverized with the spade, is laid upon this shelf, or cairncment, upon which the plants are then laid, not exactly in a horizontal direction, but with the tops a few degrees higher than the roots. The earth taken out in forming the shelf is then replaced above the roots in such a manner as to form a good slope from the front of the ditch backwards: and where the soil is deep enough to admit of this being properly done, there are few situations, however dry, where the hedge will run any risk of suffering from too much dry weather at any season of the year.

It may be further remarked, that in very cold wet situations this practice is reversed; and in place of planting the hedge upon or below the common surface, it is found necessary to raise it considerably higher; for that purpose the first two spadings, or spits, taken out of the ditch, and which always consist of the best earth, are laid about ten inches back from the front; this, when properly done, forms a bed of from twelve to fifteen inches in thickness, upon which the plants are laid; the roots are then covered with the remainder of the best earth, and the bank formed in the ordinary way.

Where the hedge is either white thorn, earth, or beech, the precaution of raising it above the common surface is essential to its welfare upon cold or wet soils; and in many of these situations good hedges are made in this way, that could not possibly have been done by any other means. It must be admitted, however, that by raising it so much above the common surface, the passage of the plants is in a great measure confined to the bank formed by the earth taken out of the ditch; and, in many instances, when the winters are severe, and much black frost happens, it penetrates the bank so completely, as entirely to destroy the hedges.

In all cafes where hedges are to be made either in this or any other way, the soil, as far as circumstances will admit, ought, as has been already noticed, to be cleared, pulverized, and enriched with lime, compost, or other manures, which will not only enable them to pull away vigorously, but at the same time prevent, in a great measure, the discomforts of moths, or cankerings, which hedges upon stiff clay, or other cold wet soils, are very liable to be affected with, and of course much injured by them.

In speaking of the simple ditch fence, notice was taken of the necessity of giving it a proper slope, to prevent its tumbling in after frost, or being excavated by the run of the water. Where a hedge is added to the ditch this precaution is equally essential, indeed more so, as the injury done to a simple ditch can be repaired with the spade at little or no expense, whereas, when a hedge is planted in
the front, any considerable portion of the earth falling down brings the plants along with it, and makes a breach in the hedge, which no industry will afterwards be able to remedy. To keep them very broad at top, and gradually tapering towards a point at bottom, ought to be a constant and invariable rule; ditches so constructed are seldom, if ever, undermined, and retain their shape for many years. Upon ditches so formed, from their containing little water at bottom, the greatest pressure of the fluid are upon the upper part, and upon this part of the nature of the slope, its effects are felt. Tho' who have made sufficient observation know, that in every instance where water acts upon a perpendicular surface (especially if the soil is of a soft inequilibrium nature) its force is greatest, whereas, when it operates upon a sloping bank its face is short, and its consequently does no injury. A knowledge of the laws of hydrostatics explains this. The pressure and operation of fluids is always in proportion to their altitude or perpendicular height. Upon a sloping bank this pressure is less; and the more gradual the slope, the less effect the water has. It is owing to this circumstance that the low sloping parts, both upon the banks of rivers, and on the sea-coast, continue unaltered for many ages, while the high bold parts of the shore, unless they are entirely of rock, are continually tumbling down. The same thing holds good in regard to ditches; whatever the height of the column of water may be in the middle, or however rapid the current, the narrowest of the ditch at bottom, and its sloping gradually upwards, divides and diminishes the force to completely, that it is scarcely felt upon any part of it; whereas, when the ditch is well faced, and of one uniform width from top to bottom, the water, by being confined almost entirely to the under part, runs away the soil, and excavates and undermines the sides of the ditch, which occasions their breaking down and being carried away.

In cafes where the purposes of the proprietor or occupier require that the fields recently inclosed with ditch and hedge should be made fenced at once, it is very common either to surround them with a railing or paling placed upon the top of the bank, formed by the earth taken out of the ditch, or with a wall of coarse loose stones, in the form of a Galloway-dike, placed also upon the top of the bank. Where stones are in plenty, this last forms an excellent fence for the purposes of completing the cattle, and is at the same time a good shelter for the hedge. Fig. 4. in the plate, represents a young hedge protected by an open wall of this kind, which answers well, and has a neat appearance.

For cafes in which a railing or paling is placed upon the top of the bank, they are made of different materials, according to the circumstances of the particular cafe; in some situations they are made of flints, in others of haths, the plantings of far plantations, &c. in all of which, when properly executed, they not only answer the purpose of a temporary fence, but at the same time serve as a complete protection to the young hedge, from the depredations of sheep and other farts of live stock.

Hedge and bank.—This is a kind of fence that consists of a hedge planted upon the plain surface, with a bank or mound of earth raised behind it by way of protection. A very good idea of this fence may be formed from the figure. This bank, in some instances, is faced with sod on both sides, sloping gradually towards the top; while in others, and indeed by far the greatest number, it is only faced on one side, which is nearly perpendicular, and has a gradual slope on the other, similar to the bank made with the earth taken out of an ordinary ditch. The hedge is frequently planted at the bottom of the perpendicular side that is faced with sod; but in many cases it is planted on the other side, near the bottom of the sloping bank of earth. The last is certainly the best situation for the hedge; for if the earth with which the bank is made has been taken, as it generally is, from the side that is faced with sod, this fencing will form a kind of funk fence, the bottom of which will be conveniently below the common surface: of course, any hedge planted in such a situation will not only be put into the worst of the soil, but will at the same time be in danger of perishing from the moiture lodging there, and chilling the roots; whereas, when it is planted on the other side, near the bottom of the slope, the plants have the best of the soil to strike in, and are in a great measure secured against the bad effects of flagrant moiture and wetness.

It may be remarked, that in bleak exposed situations, where hedges cannot be successfully reared without shelter of some kind or other, the bank of earth is a good contrivance, as itScreen the young plants from the inclemency of the weather, till they acquire a degree of strength sufficient to enable them to resist the rigour of the climate, which it is now well known many plants are able to do when they reach a certain age and strength, that would have been completely killed, had they been exposed in the same situation, without shelter, at an earlier period. In such cases of coarse earthen mounds, similar to what has been described, or stone walls, are essential to the rearing of good hedges, especially in a very fresh situation. But in this fence, like the common turf wall, cannot be erected without a considerable destruction of the adjoining surface, it should never be used but in cafes of the strongest necessity. The only instance in which it can be made without any loss is upon the sides of highways, where the road is not bounded by a ditch, but slopes gently to each side; in that case a sufficiency of turf and earth for facing and forming the bank may be had from the side of the road. This will have a double advantage; the earth, if taken from the road with judgment, and in such a way as to form a gradual slope from the middle towards the sides, will produce two very considerable advantages; the slope will keep the road perfectly dry, and the earth taken from it will, with the assistance of a flight palings, completely inclose the field, and serve as a protection to the young hedge. It is worthy of remark, that when the hedge is planted behind the bank, the palings should not be upon the top, as is commonly the cause; but on the side next the field, to serve as a protection against the cattle grazing in it; when it is next the road, however, the palings may be placed upon the top, in which case it will render the fence more inaccessible and secure from all sorts of depredations. Fig. 5. in the first plate on fences, explains the manner of forming it.

Hedge in face of bank.—This is a kind of fence that differs from the former principally, in having the hedge in the front of the bank considerably above the common surface, in place of having it at the bottom, as already described. The work is executed in the following manner: the bank, faced with sod on one side, and having a gradual slope on the other, is raised to the height of eighteen inches or two feet; the top is then levelled, and covered with two inches of good earth, above which the plants are laid horizontally, with their tops projecting about a couple of inches over the edge of the bank; the roots are afterwards covered with the same mould, and the bank raised to the desired height. This fence is greatly inferior to that already described, as the hedge-plants, by being raised so much above the common surface, are liable to great injury, not only from the bank decaying and moulder down, and by that means depriving them of their nourishment.
ment and support, but also from the effects of frost, drought, 
&c. In many instances, however, it may be useful, espe-
cially in the inclining of wet lands, where hedges would not 
thrive, if placed upon the common surface; but in such 
cases it is worth while to notice, that great advantage will 
arise from placing the hedge-plants about eight or ten 
inches back from the front, upon a sort of scarceament, 
similar to what is done in the common ditches. When 
planted in this way, there is little or no risk of the bank 
mouldering down; and the shelf or scarceament left admits 
of the hedge being completely cleared, and the earth drawn 
up to the roots of the plants; circumstances of importance 
in the growth of the hedge. This method of forming a 
hedge is shown at fig. 5, in the plate.

There is another description of hedge and bank fence 
which is met with principally by the sides of highways, in 
situations where the ground has a sudden declivity towards 
the road; in these cases it is common to cut down the face of 
the bank, in a sloping direction, to within eighteen or 
twenty inches of the bottom, where a bed is made of about 
two feet in breadth, covered with good earth broken very 
small; upon this the plants are laid, with their extremities 
about nine inches from the front; the roots are then covered 
with eight or nine inches of good mould; the bed below 
with the projection, in this case, serves the same purpose 
as the scarceament of the common ditch, and affords com-
plete room for cleaning and drawing up the earth to the 
roots of the hedge-plants. In the continuation of this fence 
it is essential to give the face of the bank such a slope, as 
to prevent the earth from tumbling down; if this is neglected, 
it will be continually falling in large masses after every 
fruit, or fall of snow or rain. It is sometimes the practice, how-
ever, instead of planting the hedge within eighteen inches of 
the bottom, as here described, to slope the bank first in 
such a way, as to infuse it against tumbling down, and plant 
the hedge upon the top, at the distance of about a foot and 
a half from the verge of the bank. A hedge planted in 
this way, when it thrives, will certainly look much more 
formidable than one planted at the bottom; but it will be 
liable to more accidents than the other, from drought, frost, 
and the falling in of the bank. It is shown at fig. 6, in the 
plate.

Hedge on top of bank.—This is a sort of fence common in 
many parts of England, and also in some parts of Scotland, 
and consists of a high bank of earth taken from the adjoining 
ground, pretty broad at bottom, and tapering gradually 
towards the top, upon which the hedge is planted. It is, 
however, to be objected to on account of the great waste of 
soil, the want of mould, and its predisposition to the pro-
don of masts. It is seen at fig. 7. This sort of fence is not 
unfrequently planted on the top with copice-wood 
plants cut off short.

Mound, or Defensive fence.—This is a sort of hedge and 
bank, as it consists of an earthen mound six or seven feet 
wide at bottom, five feet in height, and four feet broad at 
top, being moulded up between two sod banks, and 
upon the middle of which a row of quacks is planted, and 
on each side, at two feet distance, a row of willow stakes, 
of about an inch in diameter each, and from eighteen inches 
to two feet long, are fluched in, fluffing a little outwards; 
these stakes soon take root, and form a kind of hew fence 
for the preservation of the quacks in the middle. This 
fence nearly resembles the hedge on the top of a bank, and 
is equally expensive in the erection; the formation of the 
bank deprives the adjoining surface of its belt soil, and the 
plants made use of are liable to every injury that can po-
libly arise from drought, frost, and the gradual decay or 
rumbling down of the mound. The addition of the willows 
to this fence is certainly a disadvantage; for the quacks 
require protection, dead-wood is equal to every purpose 
that could be wished or expected; and at the same time possi-
bles the additional advantage of requiring no nourishment, and 
having no foliage to shade the quacks or other plants. It is 
seen at fig. 8.

Different sorts of hedge-woods may be proper in forming 
fences of this nature in different soils and situations. In 
poor thin soils, in bleak exposed districts, furze is often 
found to afford a good fence, as well as considerable shelter. 
But in this case the sides should be kept pruned, so as to 
prevent a close firm face above the top of the bank. In fi-
milar exposed high tracts of land, the beech and fycamore 
are likewise found beneficial in raising fences. But in lower, 
more favourable exposures for the growth of hedge-wood, 
the hazel, oak, and ash may be had recourse to for this 
purpose. The fallow is also a sort of wood that often 
grows well on the more high and dry aspects, and may be 
useful as a fence-wood in such places.

Hedge with post and rails.—This is also a sort of fence 
frequently employed; the railings being frequently employ-
ed for the protection of hedges, as well those that are plant-
ed upon the plain surface, as for the hedge and ditch united. 
The addition of a paling is, however, more immediately 
necessary, in cases where the hedge is planted upon the plain 
surface, especially when the fields so inclosed are in pasture. 
If only one field is inclosed in this way, and the adjacent 
lands are under a corn crop, a single railing on the inside 
of the inclosed field will be quite sufficient for its protection; 
but when the adjacent fields are also under pasture, a dou-
ble railing becomes necessary; or, in other words, a railing 
placed on each side of the young hedge, at a sufficient dis-
tance to prevent the sheep or cattle from cropping it; with-
out such protection the hedge plants are not only liable to 
cropping, but also to being trodden and destroyed by their 
feet; an injury which, when it happens at an early period 
of their growth causes the plants to continue low and stunted 
ever afterwards. It is shown at fig. 9. Any sort of coarse 
wood, as the thinnings of timber plantations, answer well 
for this purpose.

Hedge and dead hedge.—This is a fence that consists of a 
row of quacks, or other hedge-plants, set either upon the 
plain surface, or in the face of a ditch or bank, having a 
dead hedge to protect them. This dead hedge answers a 
double purpose, namely, that of protecting the young plants 
from the injuries they may receive from cattle, or the incle-
mony of the weather; and at the same time forming a tem-
porary inclosure, which helps till the hedge is grown up. 
Where dead hedges are made of proper materials, such as 
the cuttings of thorn hedges, &c. and are well let into the 
ground, they answer these purposes very completely, and 
should always be used for the protection of young hedges 
where the materials can be obtained at a very rate. It is 
worth of notice, however, that in every instance where 
dead hedges are used for the protection of hedges, in place 
of encloising them close together, as is commonly done, 
there should be a distance at least three feet between them.

In this way the hedge plants will have room to grow and 
spread out their lateral branches at bottom; a thing essen-
tially requisite to the formation of a good hedge, while an 
opportunity will at the same time be afforded of weeding the 
hedge, and freeing the earth completely on both sides of the 
plants. This sort of fence is shown at fig. 10, in the plate.

Hedge and wall fence.—This is of two kinds, one of which 
will be afterwards described, namely, a course open wall,
made of loose stones, resembling a Galloway dike, made upon the top of the bank formed by the earth taken out of the ditch. The second is chiefly used when hedges are planted upon the plain surface; in which case the wall, though thin and low, is regularly built, and serves the double purposes of sheltering and encouraging the growth of the plants, while they are in a weak tender state, and afterwards prevents the possibility of the hedge becoming open below; where gardens are entirely, or in part, surrounded by hedges; and in the inclining fields by the sides of highways, especially in the vicinity of great towns, where dogs and other destructive vermin are apt to creep into the inclosures, and annoy the flock; the low wall forms a valuable addition to the fence. It is customary in some cases, after the hedge has attained a certain height, and is thought to be out of danger, either to remove the wall entirely, or allow it to decay. This, according to Mr. Sommerville, is certainly a bad practice, as it not only leaves the bottom of the hedge naked and open, but at the same time deprives the roots of the plants of a protection, which they have already received, and which, in one particular, is that of the bank being faced with stones, instead of sod or earth. When such a fence is attempted in a level country, the wall must be very broad, not less than four or five feet, and the middle of it filled with earth; in short, the construction should be nearly the same as the Devonshire fence, already described, only the facing on each side to consist of stones in place of turf. The objections made to the Devonshire fence apply with equal propriety to this, being expensive in the erection, troublesome to keep in repair, and in its nature by no means durable.

And there is still another kind of this fence, which, it is observed, in particular situations, is extremely useful; that is, where the land has a considerable declivity, which terminates abruptly on the side of a highway, or an incline running along the side of high grounds that leans very much to that side where the fence is intended to be made. This is commonly executed with a perpendicular front, and without any contrivance for carrying off the moisture in consequence of which, after a downpour, or long continued rains, the earth swells, the wall bursts, and is thrown down; when the wall is of dry stone, there is, however, little risk of this accident happening, as its open texture readily admits of the moisture passing through it; but when the wall consists of stone and lime, stone and clay, or any other substance that prevents the discharge of the moisture, the earth, as already mentioned, swells, and the wall bursts, and is thereby destroyed. In order to render a facing of this sort durable, it is requisite, if the wall is built with stone and lime, or a mixture of clay, turf, or any other materials that retch will prevent the passage of water through them, instead of building it perpendicular, as is commonly done, to give it an inclination of some degree backward, and to have openings at the bottom, at regular distances from each other, for discharging the moisture that may issue from the bank. And in order to render these openings as completely useful as possible, it should have a space at the back of the wall, and immediately at the bottom of about twelve inches breadth and the same depth, filled with small round stones; these, being thus a kind of drain, will receive the moisture that flows down, and afford it a ready passage by the openings that have been mentioned. This description of fence is shown at fig. 12. in the plate.

Hedge in middle, or face of wall.—This is a sort of fence somewhat like that last described, but which can only be made in the face of a bank where the land rises immediately behind it; the practice Mr. Sommerville considers as new, ingenuous, and deserving of attention. It is executed in the following manner: the face of the bank is first cut down with a spade, not quite perpendicular, but nearly so; a facing of stone is then begun at the bottom, and carried up regularly, in the manner that stone walls are generally built; when it is raised above eighteen inches or two feet high, according to circumstances, the space between the wall and the bank is filled up with good earth, well broken and mixed with lime or compost; the stones are laid upon this earth in such a manner as that at least four inches of the root and stem shall rest upon the earth, and the extremity of the top shall project beyond the wall. When the plants are thus regularly laid, the roots are covered with earth, and the building of the wall continued upwards; when completed, the wall is infilled with a coping of sod, or stone and lime. When the plants begin to vegetate, the young shoots appear in the face of the wall rising in a perpendicular manner. This kind of fence is shown at fig. 13. in the plate XX.

It may be remarked, that in James Hall, of Dunlugas, has adopted this mode of inclining pretty extensively upon his estates in East Lothian, and is the first who introduced that plan on the east coast of Scotland from Gallo. The appearance is at once new and handsome; the whole seems to be in a very thriving condition, and in several parts the hedges have made great progress. Most of them, however, being young, no critical opinion can be formed as to the real advantages or defects with which this mode of inclining may be attended. Apparently, it is liable to several objections. In the first place, if from weakers, or other accidents, any of the plants should suffer or die, a circumstance by no means uncommon, even where every possible care has been taken to select the strongest and best; the defect thereby occasioned cannot be supplied, without taking down the wall, at least as far as the place where the hedge was laid; this will be found highly expensive and inconvenient; the inconvenience would, however, be less, if only, if the failure of the plants happened only in one part of the wall; but when, as was the case, the plants misfitted in many different places, it will be found a very expensive and arduous business to take down and rebuild the wall in every place where two, three, or more thorns have failed. Were this labour and expense repaid by any extraordinary advantages, the practice might derive additional strength therefrom; that, however, is far from being the case; for though the plants in a hedge of this sort are, from the great quantity of earth laid upon their roots, less liable
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liable to injury from drought, frost, &c., they are at the same time further removed from the genial influence of the sun and the air.

Walls formed with or without lime have been raised on the banks behind the new-plant ed quick-set hedges, instead of a palis or railing, to the height of about two feet and a half, with great success by Sir George Ball in Scotland. The base of the wall is placed about one foot or more, or a foot, from the plants of the hedge, being made two feet thick at the bottom, battered to one at the top, and coped with flat stones and turfs. Where fences are plentiful these are found cheap and useful in rearing the young hedges.

Hedge and ditch, with row of trees.—This kind of fence differs from those which have been described only in having a row of trees planted in the line of the fence along with the hedge.

The advocates for this practice say, that by planting hedge-rows of trees in the direction of the fence, the country is at once sheltered, beautified, and improved; and that the interest of the proprietor is ultimately promoted by the increasing value of the timber raised in these hedge rows. It is also said that such trees produce more branches for stack-wood, knees for lisp-builders, and bark for the tanners, and they sell at a higher price for load than trees grown in woods and groves. Besides, close-growing hedge-row trees to the height of twelve or fifteen feet, produce, while damaging the hedge, the shelter which they afford is favourable to the vegetation both of grass and corn; it also tends to produce an equable temperature in the climate, which is favourable both to the production of, and greater perfection and beauty in animals, and of longevity in man. Though the practice of planting hedge-rows of trees is very common (especially in England), though its advocates are numerous, and though these arguments are urged in its favour, yet the objections are also entitled to very serious consideration. When trees are planted in the line of a fence, if that fence is a hedge, the plants of which it consists will, Mr. Sommer ville says, not only be deprived of a great part of their nourishment by the trees, but will also be greatly injured by the shade they occasion and the weight of the drop that falls from them during wet weather; upon this point little reason ing is necessary, for, if we appeal to facts we shall find that no good hedge is to be met with where there is a hedge-row of trees planted along with it. The mischief is not, however, confined solely to hedges; the effects are equally bad, perhaps, worse, where the fence is a fence proper, whether in this case the shade or drop of the trees is hardly, if at all felt, yet when they have assumed a certain height, the working and training of the roots during high winds are such, that the foundations of the walls are shaken and destroyed; accordingly, whenever large trees are found growing near stone walls, the fence is cracked and shaken; by every gale of wind, is perpetually falling into large gaps, and costs ten times the expense to keep it in repair, that would otherwise be required, if no trees were near it. Admitting, however, that the trees in hedge-rows were no way prejudicial to the fence, which we have already shewn is by no means the case, another argument may be successfully used against the practice. It is seldom, indeed, that trees planted on hedge-rows arrive at any great size; on the contrary, they are generally low and stunted; and while they occasion a visible loss by the mischief they do the fence, their utmost worth, when they come to be sold, will seldom be found adequate to the loss and inconvenience they have occasioned. This is very satisfactorily accounted for, from the want of shelter; trees planted in hedge-rows being exposed to every inclement blast, by that means they are deprived of what is very essential to promote their growth, and which is in fact the cause why trees in large plantations thrive better than when they are planted singly; namely, the mutual shelter which they afford to each other; it being observed that all trees on the flakes of plantations are much lower than those more removed from the extremity; this is owing to their being the first part of the foliage, which after being once broken its violence is gradually abated, and in proportion as the trees recede from the verge of the plantation they feel it less, and rise to a larger size and dimensions.

It may be further observed, that hedge-rows of trees are in a still more unproductive situation than those which form the flakes of a plantation; the latter being exposed to the violence of the wind only when it blows in one direction; this is what is generally termed the prevailing wind; when the gale is from any other quarter they can hardly be laid to feel it; whereas, hedge-rows are exposed to the ravages of every blast, in whatever direction it may blow. There are, no doubt, some favoured spots where not only hedge-rows, but even single trees, may thrive and attain a great size, without any protection whatever; the fences in which this happen are, however, but few, and can in no sense be quoted in support of the general practice of planting trees in this manner. Where the practice is adopted, the method shown at fig. 14, 15, 16, is that which is to be followed.

It has been suggested by some, that various sorts of fruit-trees and shrubs might be planted in hedge-rows, with great profit to the proprietor and farmer, such as those of the plum, bullace, cherry, apple, gooseberry, and hibbert kinds. How far any material benefit could be procured in this way to the farmer or the nation is uncertain, as few trials have yet been made; but it is well known that where trees of any description are set out in hedge-rows, they quickly destroy the hedge-plants which are near them, and of course, ruin the fence. And this would certainly be the case if they were planted in the close manner that has been advised. Besides, hedge-rows formed of such sorts of plants alone would never become fences of any great utility in the view of enclosing the lands, except in the café of the gooseberry, which has long been known to constitute an excellent fence. This plan of raising fruit is likewise liable to various other objections, grounded on the impossibility of protecting the produce.

Hedge and ditch, or wall, with belt of shrubbery.—Though for the purpose of enclosing situations it is strikingly useful and ornamental, while, upon the low grounds, it is torpidly unnecessary, but in some instances abjectly hurtful. For instance, in deep and broad valleys surrounded by hills and sheltered from severe blasts, belts of planting are not only unnecessary, but even hurtful and ruinous to the ground they occupy, which could certainly be employed to greater advantage, and the original expense of planting saved. There are many instances, both in Scotland and England, of low, flat, rich lands being enclosed, and completely protected from the inclemency of the weather, without any aid whatever from this fence. There are other situations, however, where, though the lands are very flat, and the soil good, yet, from the want of hills and high grounds in the neighbourhood, they are so much exposed to the sea blasts, and a current of air, passing over a great extent of country without any interruption, that the value of the soil is thereby very much diminished. The peninsula which forms the county of Cuthbert in Scotland is a striking proof of this; with a soil of a very good quality and highly improvable, its value is greatly impaired by the circumstance of its being so much exposed to sea winds,
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winds, which, coming from a very inauspicious quarter, and blowing over a considerable extent of country, without meeting with any obstacle to break the force or change their direction, blow with uncommon severity and fierceness, and in that way are an effectual check to vegetation. There are very extensive tracts in England, in nearly the same situation, the whole of which might at a small expense be fenced and rendered completely productive, by interjecting the country in a judicious manner with plantations and hedges, either separately or joined in the hedge and belt of planting. They should be properly disposed in directions so as to oppose the most injurious and offensive winds, and where their force can be the most effectually broken and warded off. Across valleys, dills, and exposed plains, as well as on the ridges, points, and hanks of hills, they may frequently be found particularly beneficial. In the formation of them considerable pains and attention will be found necessary. It is essential that the plants made use of should be well suited to the nature of the soil and exposure. Where the situations are of the bleak and barren description, the larch may be most beneficial as timber, but much inferior to the common fir in the view of shelter in the winter season, when most frost in need of. Where live flocks are to derive advantage in this way, the plants employed should be such as are close at the bottom, otherwise mischief may arise, especially to sheep, from snow driving through and drifting on the contrary side. Where larch is used, therefore, the common fir should be had recourse to for the outward most which, by being cut or headed down to about twelve or fourteen feet, will afford the necessary shelter for a great length of time, as they would, in that case, throw out lateral branches, and become feathered to nearly the bottom, while the larch, by rifting to considerable height, would lessen the force of the winds above, and render the air more mild.

In left exposed situations the beech, by retaining its leaves through the winter season while young, constitutes a good plant for this purpose. Where the soils are deep, the oak may also be used in the same intention; and the holly is a sort of plant that, in particular cases, is capable of application in the same view.

In every case where it is meant that the hedge and belt of planting shall constitute a durable and efficient fence, it must be made of a certain breadth; from forty to fifty feet is the very least breadth that should be allowed; and in cases where the situation is very elevated, and the intrinsic value of the soil small, the belts should be three times this breadth; such a space will allow abundant room for planting such a number of trees as will, by the mutual shelter which they afford to each other, promote their growth, and protect them against the blasts which are so feverish in those elevated regions. The more effectually to promote the desirable purpose of sheltering the young trees, they should be planted very thick; perhaps four or five times the number that is meant to be allowed to grow to the full size should be planted. The expense of the plants in the first instance will be very trifling, and much more than repaid by the value of the seedlings after they have attained a certain age; with this additional benefit, that the whole plantation will grow faster, and in that way sooner answer the purpose of sheltering the lands. Planting an extra number of trees is also beneficial in another point of view, namely, that of affording a choice of the most healthy plants to be left, when the plantation is thinned out at first. This sort of screen fence is represented at fig. 4. in the plate.

It may be remarked that the manner of protecting these belts is different in different situations; where wood is plentiful, a simple palisade, or ditch and palisade, forms the fence; where stone abounds, a wall is frequently made use of; but in by far the greatest number of cases the ditch and hedge already described, or funk fence with a hedge upon the top, are adopted; or any of these, when properly executed, will answer this purpose extremely well; but as there are some of them better and more durable than others, and a permanence ought never to be lost sight of, either in this, or any other mode of enclosing, it is of consequence to fix upon that which unites immediate use with durability. The stone wall, funk fence, and ditch and hedge, are certainly the most durable; the two first are indeed complete at once, and every benefit that can be derived from their use is immediately obtained; the hedge and ditch, on the other hand, rises by very slow degrees, during which the belts are exposed both to the weather and the injuries arising from sheep and cattle breaking into and trampling upon the young trees; after all, it is very seldom that a hedge which surrounds a belt of planting forms a good or useful fence, as being very liable to fall into gaps and open places.

Fences of this nature are obviously beneficial in several different points of view, as, by defending the soil and live flock upon it, from too much cold and exposure; by warding and breaking off the more severe winds and storms; and by promoting a general warmth and mildness of the atmosphere in such situations.

Hedge and ditch, or wall with corners planted.—This is a mode which is employed upon some estates instead of the belt of planting. Upon an extensive property, and where the belts are not very large, it is a mode of muffling which has a good effect upon the scenery of the country, and answers the purpose of general shelter extremely well. It certainly has a more pleasing and natural appearance to the eye than the flat formal look of a number of straight belts running in parallel lines; it is, however, greatly inferior to the belt of planting, for the purpose of sheltering particular fields. But as in every field there is a space in each angle that cannot be ploughed, by planting these spaces, which would otherwise be left waste, the country is thereby ornamented, and many valuable trees raised with little expense, and with scarce any waste of land. This is a plan which is particularly recommended in the Staffordshire Report. "In every acre for an inclosure, let there be," says the writer, "a chaufe obliging the proprietor of the new inclosed land to plant a certain number of oaks in proportion to his share of the inclosure, and directing the plantations to be made in the angles of the fields; by adopting which plan a less quantity of polls and rails would be required, and the angles of each field would be converted to a profitable use, and corn would grow close up to the rails, whereas no corn will now grow in such angles. This is not the only advantage that would arise from this plan; the trees, full grown, would afford good shade for cattle, and an easy communication through these plantations would be from field to field. It would also be very ornamental to the country." Others, however, doubt the utility of this practice, as, in point of fact, the greater number of such corners are necessarily occupied by gateways that could not, without considerable inconvenience, and increasing the farmer's labour, be made use of in any other way. The method in which plantations are formed is shewn at fig. 5. in the plate.

Furse, or Robin fence.—It is evident that hedges of this kind may be had recourse to with advantage; whenever such plants are found to grow vigorously in a soil; and others of a better kind cannot be had. Fences of this nature
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Nature are mostly made upon mounds or banks of earth by flowing the seed of the plant. Sometimes the bank is only flopped on one side, but at others on both; in the former case the front is perpendicular, and faced with turf or stone. From these fences being raised so considerably above the common surface, they are very liable to injury from frost and other causes in severe winters. Different fences of this sort are represented at figs. 6 and 7, in the plate.

Railing and palisade fences.—These are such as are constituted of some sort of woody material, either in a rough or more finished manner. In speaking of palisade or timber-fences in general, it has been observed by Mr. Sommerville, in his excellent essay on this subject, that in all permanent plans of inclosure, palisades are only to be considered in a secondary light; for of whatever wood they are made, however substantially they may be executed, or in whatever situation they are placed, their decay commences the instant they are erected. The slightest attention will be sufficient to convince every person of observation of this truth. Where permanent use therefore is required, palisades ought never to be adopted; but for ornament in pleasure-grounds, or for the protection of young thorns, they are highly valuable. When the different kinds of palisades come to be spoken of, notice will be taken of the mode of constructing each; but as there are certain circumstances which may be considered as common to all palisades, this is judged the most proper place to mention them.

In all cases where either dead hedges or palisades are used, the decay and ultimate loss of the fence is owing to that part of it which is let into the ground being rotted by the moisture. Where dead hedges are planted, it is no easy matter to provide a remedy against this evil; as the items are so numerous, that to give each of them a preparation that would completely defend it from the effects of moisture, would be attended with an expense equal to, if not greater than, the value of the fence. Where palisades, however, are used, especially the most expensive and substantial kind of them, and such as are meant both for duration and ornament, it is desirable to prepare the standards, or upright parts that are placed in the earth, in such a manner as will enable them to resist the moisture for many years. In the south of England, the post is always more bulky at the lower end than the upper, and is fixed in the ground by digging a hole, placing it therein, shovelling the soil in gradually, and ramming it round the post till it be firmly fixed. It has been a practice, time immemorial, to burn or ckar that part of the standards or palisades intended to be let or driven into the earth: the reason alligned for this practice was, that the fire hardened the posts thus subjected to it, and by rendering them impervious to moisture, made them more durable than they would have been without such operation; but it probably depends upon their being thus rendered less susceptible of decomposition. The benefit would not be lost against the effects of the weather, is the above writer afferts, the bark of the tree. This covering has from nature, and it is pollished of every requisite that is necessary, being impregnated with oil, resin, and other matters, which confine it completely, not only against moisture, but other injuries arising from the operation of air, light, heat, &c.; of this we have strong proofs by observing what happens where the bark of any tree is destroyed, by cutting off a branch, or otherwise. If the surface laid bare by the wound is considerable, the body of the tree opposite to it begins immediately to decay, and continues to waffle, unless some covering is made use of to supply the place of the bark for that purpose: nothing has yet been found so effectual as a coat either of boiled oil, or oil-paint, which, by completely excluding both air and moisture, not only preserves the tree from rotting, but also prevents it from bleeding and waffling itself by an effusion of juices from the wound. When trees are cut down and laid into planks, whether for palings or any other purpose, where they are afterwards to be exposed to the weather, the same thing happens that we have mentioned as taking place with the growing tree when deprived of its bark, but is a much greater degree, as the whole surface is then without a covering. To prevent this decay the same remedy should be applied, viz. painting the whole of the wood, or otherwise filling the pores with oil in such a manner, as to prevent the entrance of moisture. There are now scarce oil paints fold of all colours so cheap, as to enable persons erecting palings, or other works of wood, to paint them at a small expense. Another very good remedy is to be had at a moderate price, (lord Dundonald's coal-varnish,) into which, if the post of the standards that are to be drove or set into the earth are dipped while the varnish is boiling hot, it will preserve them from the bad effects of moisture for a considerable length of time, previous to the dipping, they should be properly sharpened, and upon no account whatever charred or burnt, at every attempt of that kind will, upon inquiry, be found to injure the texture of the wood, and hasten its decay. This application, which has been found highly valuable for many purposes, and for which the noble discoverer is entitled to the gratitude of his country, has only one fault; namely, that it does not penetrate deep into the wood, and after being laid on a few months, is very apt to scale and throw off with frost, or the action of the sun; it has the farther disadvantage of injuring the appearance of the wood, and giving it an old, black, decayed look. Common tar, or melted pitch, may also be successfully employed for the purpose of defending the extremities of the upright parts of palings from moisture; linseed and train oils may also be used with success; the great object being to fill the pores completely with some unctuous or greatly matter, so as to prevent the admission of moisture. The posts should be completely dry before they are dipped in any of these preparations; for if they are either made of green wood, or have imbued much moisture, if after being dipped they are exposed to the sun, or a severe frost, the moisture will become so much expanded thereby, as to burst through, and bring off the coat of paint and varnish, &c.; whereas, when they are made of well-seaoned wood, and are at the same time perfectly dry, and the pitch, oil, varnish, &c. boiling hot, it readily enters the pores, and by filling them completely, prevents the access of moisture, and consequently the injurious effects produced by it.

It is further remarked, that in a few instances, a method different from many of these has been tried, and found in some degree to answer. Instead of sharpening the points of the standards, some are left of the former bipes at both ends; and the extremities, instead of being drove into the earth in the ordinary way, are let into large stones sunk into the earth, with round or square holes cut in them, of such a size as to admit the round or square ends of the posts. In this way the upright posts of palings certainly last longer than when they are drove into the earth without any preparation; but the difference of durability in the two cases bears no kind of proportion to the difference of expense; and as the stones are sunk into the earth, and of course within the reach of the moisture, the decay of the palings, though somewhat protected thereby, is in the end equally certain. Upon the whole, when the expense and durability of these different methods are compared,
pared, it will be found by much the best way to drive the
standards into the earth, after having previously prepared
them by dipping the extremities into any of the articles we
have mentioned, and of which any of the coarse oils are
supposed by far the best. In addition to which he has to
add, that this dipping and preparation should be so applied
as to rise several inches above the surface of the earth after
the standard is drove into the ground; for if no more is
dipped than what is driven in, the wood will imbibe the
moisture at the surface, and very soon rot and decay at that
place. Thus much is necessary to be paid of the preparation
of that part of the wood which is drove or set in the earth.
To render the whole paling as durable as possible, it should
receive a covering of lord Dundonald's varnish, or one of
the coarser kinds of oil-paint, or oil. Where use only is
wanted, and the appearance of the paling is not an object,
a coat of varnish or oil will answer very well, but when a
paling is made of dressed wood, substantially executed, and
in fight of the road, or of a gentleman's house, it becomes
necessary to unite use with ornament. In such cases a coat
of white or green oil-paint will defend the wood equally
well, and look much better; where it is intended that the
paling shall be permanent, and appear visible at great distance, and con-
vene an idea of boscofare, the white paint should be used;
but when it is meant to conceal the fence, and give an un-
broken view of extensive lawns or pleasure grounds, the
green paling is preferable; next to the hacha, or sunk
fence, it is the best contrivance for that purpose, being of
the same colour with the grass, it is not visible to the eye at
any great distance. After having thus mentioned what ap-
pears most essential respecting palings in general, we may
proceed to notice the different kinds that are made use of
for the purpose of inclosing land in different circumstances
and situations.

Simple nailed paling.—This is a fort of paling, or rail-
ing fence, that consists of upright posts drove or set into the
earth at certain distances, and croffed in three, four, or
more places, with pieces of wood in a horizontal direction.
This description of railing, or paling, is for the most part
made of coarse fawn wood, without any dressing whatever;
in Scotland it is, Mr. Sommerville says, termed a slab-paling,
and is the one commonly employed for the protection of
hedges, and for strengthening ditches, &c., where a general
idea of the space is wanted, as in parks, &c. He thinks it
answers extremely well; but that, where durability is required, and
no other fence is used, it will be found a very insufficient fort of fence. A method
of constructing it is shewn at fig. 8. in the plate.

This railing is often made with only two horizontal pieces,
and answers well where no great height of fence is required,
as in defending young thorn hedges, and many other similar
purposes. It has likewise, in some cases, only one lon-
gritudinal piece, fawn in a triangular form, nailed firmly down
upon the tops of the upright posts.

Jointed horizontal paling.—This fence consists of many
square piles, drove or set into the earth at regular distances,
through which mortises, or openings, are cut, for the ex-
tremities of the horizontal pieces which traverse them.
When properly executed, this fence, it may be observed,
has a neat and durable appearance. It is, however, much
less so than it appears to be, as the points of the piles drove
into the earth loom rot, and the mortises, or openings, cut
in the body of the piles for the reception of the horizontal
pieces, weaken them very considerably; so much so, that, in
many instances, the railings, or palings, decay fast at these
places where the joinings, or mortises, are made. It may be
further remarked, that where valuable palings of this kind
are made, there is an easy method of fastening the hori-
zontal to the upright parts of the paling, without cutting
or weakening any part of the upright polls. This consists
in fixing the croffs, or horizontal bars, to the upright polls
with iron staples. Thence, while they answer every purpose
that can be expected, from binding and connecting the dif-
ferent parts of the fence, have, it is conceived, not the
smallest tendency to diminish the strength, or accelerate the
decay of any part of the fence. This form of paling is re-
preated at fig. 9. in the plate.

Upright latch-paling.—This is made by driving or setting
a number of strong piles into the earth at regular distances,
and croffing these at top and bottom, and sometimes in the
middle, with horizontal pieces of equal strength; upon these
latch are nailed, at from six to twelve inches distance, a
number of flat, or square pieces of fawn wood, of the shape
and size of the laths that are used for the roofs of tiled houses.
This form of paling, when properly executed, looks very
well; and, notwithstanding its apparent flightiness, if well
supported by props, or rebs, at regular intervals, lasts a long
while; and, where there are plantations of young firs in the
neighbourhood, laths may be made at a trilling expence.
For the protection of young hedges, &c., it is a useful
purpofe, and where the writer just mentioned thinks, be found superior to almost every
other, as the closures of the upright pieces prevent the
sheep or cattle from putting their heads through between
them, and cropping the young hedge; an advantage which
horizontal palings do not possess. For gardens it will like-
wise, it is conceived, be found both useful and ornamental,
and infinitely better adapted to the training of fruit-trees
and currants than the effalier-railings commonly used. It
is seen in the plate at fig. 10.

Horizontal young wood-paling.—Young firs, or the thin-
nings, or weedings, of any other sorts of young trees, may
be beneficially employed in this way. They may be had
recourse to with great advantage upon estates where there
are extensive woods, or where they are surrounded by belts or
thriving plants; the thinnings of such woods, or belts, being
highly valuable for making such palings, especially when
the plantation consists chiefly of firs; the palings of young
firs are of two kinds, either horizontal or upright. The
horizontal resembles the jointed, dressed paling, described
at fig. 9. but the upright is another kind, and is usually
called fig. 11. in the representations that are here
shown, the young fir boughs, of which figs. 11. and 12.
in the plate are formed, have their lateral branches cut off at
the distance of about three inches from the trunks. This
method has several advantages, as that of rendering them
stronger than they can possibly be when the lateral branches
are cut close by the trunk; the labour required to prune
them is also less, and they make a better fence than such as
are close trimmed, as the sharp projecting points prevent
the sheep or cattle from leaping or rubbing upon them so
much as in other cases. For rough purposes they answer
perfectly well.

The upright paling of young firs, represented at fig. 12.
however, in place of being made in the manner above de-
scribed, is sometimes formed by driving the upright parts
into the earth, and covering them at the top with a piece of
flat fawn wood, through which holes have been previously
bored with a large auger, to admit the sharpened points of
the upright piles; this forms a very neat paling, and, when
well secured with spurs, or rebs, at the back, lasts a con-
siderable length of time without the necessity of being
much repaired.

Horizontal chain-fence.—This is a species of fence which
is made by fixing a number of strong square polls, or piles,
into the earth at regular distances, in the direction in which


the fence is to fit; each of these piles has three strong staples, or iron hooks, driven into it on each side; one near the top, one within eighteen inches of the bottom, and one in the middle; to these staples, or hooks, chains are fastened and stretched horizontally, in the same manner as the pieces of wood are in a common horizontal wooden fence. When it is meant that the fence should be laid open for any temporary purpose, hooks are driven into the posts in place of staples, and the chains hung upon them; but where this is not wanted, the staples will be found the most secure method. In some cases the upright parts of this fence, in place of wooden-piles, such as have been described, consists of neat pillars of mason-work, with hooks or staples bolted into them for fastening the chains to; these, when properly executed, look extremely well, and last much longer than the wooden piles. In a few instances the purpose of posts is answered very completely by large growing trees, into which hooks or staples are driven, for fastening the chains, as in gentlemen’s avenues, public walks, &c. For the confinement of horses or cattle, a chain-fence will answer very well; and if the pillars are of stone, will be very durable, but will be found totally unfit for inland purposes. Being meant to be shifted, and it is besides so very expensive, that it can never come into general use. In avenues, however, and public walks, and for stretching across rivers, and pieces of water where there are no flood-gates, and where no other fence can be made to complete the inclosure, they will be found preferable to every other contrivance that can be had recourse to. There is a fence of this sort represented at fig. 1. Plate XXI. There are a great many varieties of fences of this description, some being made very light, while others have great strength and weight. The chain is usually procured from the ironmonger, being sold at different prices by the pound.

Net-fence.—This is a method of fencing chiefly used in shrubberies and pleasure-grounds, and consists, like the last, of a number of square piles of wood drove or set into the earth at regular distances, each of which has a couple of holes bored through it, one at top, and another at bottom, large enough to admit a rope of about twice the size of a man’s finger; these ropes, after being drawn through the holes, are stretched the whole length of the fence, and well secured, and upon them a flannelet is fastened, of a length and breadth suited to the fence, either by sewing or tying it at regular distances with strong cord or rope-yarn at top and bottom; it is farther secured below by one or more wooden hooks driven into the earth between each of the piles; this completes the fence; but to render it durable not only the piles, but also the net and ropes, should be covered with a coat or two of good oil-paint. When well finished this fence has a very pretty appearance, but is neither a durable nor useful one, as sheep and cattle readily entangle themselves in it, and tear and destroy it with their horns; indeed, in many instances the fence gets itself so much entangled, that in struggling to disengage themselves they are either much hurt, or entirely strangled. In point of utility, the net-fence has nothing to recommend it; but as it will in many instances give a neat finished look to pleasure-grounds, it may be worthy of a place among fences of these kinds. A net-fence is shown at fig. 2. in the plate. The netting employed in this way is of different sizes and weights, being sold in the rope shops by the pound.

Rope fence.—This is a fence of nearly the same kind as the former, that is, it consists of upright posts, drove into the earth at regular distances, with holes bored through them for the ropes to pass; in general they consist of three, and in some cases of four, courses of rope, like the chain fence. This can only be used for confining cattle or horses; for sheep they will be found quite incompetent: for stretching across rivers or pieces of water, as has been noticed when speaking of the chain fence, the ropes will be useless; or even for adding to the height of a stone, or turf-wall, especially the latter, into which if posts are drove at certain distances, and one course of ropes put through them, such an addition will render a very insufficient fence secure and valuable. One observation seems, Mr. Sommerville thinks, necessary upon the subject of this fence, namely, that the perforating of the posts for passing the ropes through weakens them considerably; notice has already been taken of a similar mischief in the jointed horizontal palings, or posts and rails framed, and a remedy pointed out, viz., that of fixing the cross bars or horizontal pieces to the upright parts by staples. In the rope fence this may be referred to with equal advantage, as staples or ring-bolts drove into the wood answer every purpose, without impairing, in the smallest degree, the strength of the posts that are used. The appearance is not however so neat in this way, as where holes are made in the posts for the ropes. A fence of this description is shown at fig. 3. in the plate.


date, hurdle, or movable fence.—This is a fort of fence which is shown at fig. 4. in the plate, and 11. and 12. in Plate XXII. It has hitherto been principally employed in coffee where sheep or cattle are fed with turnips in the field, to divide a certain portion off with their food at a time, and in this way they are extremely useful, as the sheep or cattle, by having a given quantity of food allotted them at once, eat it clean up without any loss, which they would not do if allowed to range at large over the whole field. There are, however, many other purposes to which flakes may be applied with equal advantage. They form a ready method of division in all cases where small portions of grass land are to be fed down close with sheep, in order to render the herbage more fine; and likewise in arable lands under the folding system, where the improvement of them by the manure is chiefly the object. See HURDLE.

Oxen, willows, or wattled fence.—This fort of fence is made by driving a number of piles of any of the different kinds of willow or poplar, about half the thickness of a man’s arm, into the earth, in the direction of the fence, and at the distance of about eighteen inches from each other. They are then twisted, or bound together at different places, with small twigs of the willows or poplars, as represented in the sketch. This kind of fence has some advantages peculiar to itself; it not only forms a cheap and neat paling, but if it is done either about the end of autumn, or early in the spring, with willows or poplars that have been recently cut down, the upright parts or flakes will take root, grow, and send out a number of lateral branches; and if pains are taken the following autumn to twist and interweave these branches properly, a permanent fence, so close as to be almost impenetrable, may be formed in two or three years. For the inclosing of manly lands, or for completing any inclosure, where a part of the line in which the fence ought to run is so wet as to be unfit for the growth of thorns, or the building of a wall, the willow-paling will be found an excellent contrivance, and the use of it will render many inclosures complete, that could not otherwise have been formed. This mode of fence is seen at fig. 5. in the plate.

Growing trees fence.—This is a kind of fence which is made by planting beech, larch, or other sorts of trees in the direction of the fence, at about a yard distant from each other, more or less, as may be thought necessary; these trees should be protected by a common dead paling till they
are ten or twelve feet high, when they should be cut down to fix feet, and warped or bound together with willows at top, and in the middle; the cutting off the tops will have the effect of making them put out a great number of lateral branches, which, if properly warped and interwoven with the upright part of the trees, in the manner described for the willow fence, will both have a beautiful effect, and will at the same time form a fine fence, which, in place of decaying, will grow stronger with time, and may with very little trouble be kept in perfect repair for a great length of time. In these cases sometimes the fences are formed by railings being nailed to the growing trees as poles, and then the living parts warped with them. A fence of this kind is shewn at fig. 6 in the plate.

Horizontal and upright whigle fences. — These are chiefly made of firs, coarctly sawn into deals, of from half an inch to an inch thick, and of different breadths, according to the diameter of the tree, pretty strong square poles or piles are drove or set into the earth, and the deals nailed horizontally upon them, in such manner that the under edge of the uppermost deal shall project or lap over the upper edge of the one immediately below it; the fence, when finished in this manner, will have nearly the same appearance as the bottom of a barn or cutter. This description will be well understood by those who have been in North America, where not only the roofs, but the walls of many of their houses, are made with shingles. When completed, this fence is nearly as formidable as a stone wall, though, as may naturally be supposed, it is much less durable. An upright fence is sometimes made with shingles, which, when properly executed, looks extremely well, and is indeed highly ornamental; this fence is made by fixing perpendicular poles in the earth, nailing three pieces of wood horizontally, and covering these with shingles placed perpendicularly; in this case the shingles are not above three inches broad, and the extremities of each are pointed at the top. Several fences of this kind are to be seen upon the road from Edinburgh to Glasgow, especially upon the property of Mr W. Cunningham of Livingstone, Walter Campbell, esq. of Shawfield, and some others. These upright shingle fences are painted white, and have a very handsome appearance. It is seldom that inclosures of any considerable extent have been made with these shingle fences, for, as poles, they are very expensive, and can be shifted with as much ease as flakes from one field to another; they are also useful for temporary purposes in gardens, &c. and where timbers are eaten with sheep upon the field, these shingle fences will be found preferable to the common open flakes, from the shelter they afford to the sheep. These fences may be made in many situations with advantage, and are shewn at figs. 7, and 8, in the plate.

Warped palings fence. — This fence consists of slender pieces of wood drove into the earth, bent down in different directions, interwoven with each other, and their tops fastened together with a flender fort of ceding; this fence resembles the chevaux-de-frise, with this only difference, that in place of leaving the points standing up, as is the case with that part of fortification, they are bent down and tied together. When made of dead wood this fence is equally perilous with others of the same description; but when made of growing plants it will be found very lasting. It is seen at fig. 9 in the plate.

Thorn hedges are sometimes made in the chequered method, and have a curious, though not elegant appearance, while they are perfectly secure against most forts of live flock when perfectly grown up. They are, however, liable to the objections of being more troublesome and expensive in making, and at the same time apt to be much injured by the constant rubbing of the different parts of the plants against each other. They in this way much sooner fall into decay than by the other methods of forming and managing them.

Light open palings fence interwoven with thorns, or branches of trees. — This fence differs from the common nailed fence already described, only in being warped either with thorns or the branches of trees. When properly done it forms at once a very complete fence; but, like all fences made with dead wood, it will be found very perishable, and require many repairs. It has, however, an advantage, viz. that when properly executed, it is proof against the entrance of animals of any kind. It is shewn at fig. 10 in the plate.

Wall fences. — These are constructed of different sorts of materials, but usually of earth, earth and stone, stone alone, or brick, and are of various kinds; especially in the stone wall forts, as open, dry, single, double, &c. according to the nature and lize of the stones, and the intended use of the fence. In England they are all commonly known by the name of walls, but in Scotland, the first forts more frequently by the title of terrains. They are of two main kinds, though of ones, as those of the earth, the other kinds, are not by any means durable, therefore should not be formed where other better forts can be had recourse to. The stone wall fences are the most usual fort in mountainous rocky situations, where shelter is not particularly requisite, and are commonly the most adapted to such exposed regions. They are likewise often met with in lower exposures, where the districts abound with such materials, as on the borders of rising grounds; but in such places their appearance is by no means pleasing.

By running dry, or single stone walls up in as open a manner as the nature of the stones will admit, the advantages of their being left to be thrown down by winds, and at the same time to their being levelled by sheep, are gained in some situations. In these cases they should only, however, be cope with boole stones.

Dry stone walls. — In the construction of dry stone walls it is in general essential that the stones be either taken from a quarry, or confit of the largest land-stones broken in such a manner as that they may have a good face on one side, in order that they may be laid well; that they be built by masters, and well pinned; that they have as dry and deep a foundation as possible, in order to guard against frost, &c.; that they be made wide at the bottom, and tapering upwards to about the breadth of ten inches, when the coping is to be applied; that the coping consist of materials that cannot be readily overturned or removed; and in the manner in which it is finished much of the future value and durability of the wall will be found to depend.

It is observed that dry stone walls are sometimes erected by common labourers, with the round stones gathered from the fields, and cope with sod; in other cases they are made with quarried stones, upon which some pains have been bestowed to put them into proper shape; a third kind; known by the name of Galloway dikes, and so denominated from the circumstance of its being originally used in that county. The first of these, viz. the wall or dike made with round or land stones by labourers, and covered with a coping of sod, is, it is said, a very indifferent fence. In most instances it is not only very ill constructed, and the shape, being of one uniform thickness from top to bottom, but the stones, from their round form, do not present a sufficient surface to each other, to bind and give stability to the building. This fence has long been known, and is still very common, in the remote parts of the country, upon estates where
FENCE.

the first rude essay is made in the way of improvement, and
where masons cannot readily be had. In such situations it has a two-fold benefit; the surface is cleared of many stones that would otherwise have prevented a considerable obstacle to its cultivation, and the field is at the same time inclosed; but though these objects are accomplished for a time, their benefit is not permanent, as the wall is perpetually tumbling down, and the cattle rubbing against it make considerable
gaps in many places; in that way great trouble and expense are annually required to keep it in repair. A dry
stone wall, capped with brick, is shewn at fig. 11; and at
fig. 12, the same fort of wall covered with a coping of
turf.

It is asserted, that when the stones with which dry walls are built are quarried, and done by skilful masons, broad
at bottom, tapering gradually upwards, and finished at the
top with substantial coping, the fence has a very neat ap-
pearance, and has been known to last thirty and even forty
years without repairs. A good foundation is highly essen-
tial in the construction of this fence; from nine to twelve
inches is the smallest depth that it should be below the com-
mon surface, especially if the soil is open and porous, and the
largest and heaviest stones should always be laid under-mort.
In cases where the materials do not require to be brought
from any great distance, a hundred yards in length, by the
feet in height of such a wall, may be built for 15l. or 20l.

There is one other material point in the building of these
forts of walls, which is, that they be well kept together by the
judicious placing of the longest stones.

It is customary in some parts of England to plant ivy
both upon their dry-stone walls, and upon such as are con-
structed of flint and clay; this has a good effect, not only
in point of appearance, but, after a while, it binds and
strengthens them very considerably. There are several kinds
of ivy, viz. the large and the small-leaved, the dark green and
the variegated, all of which look well; those kinds, how-
ever, should have a preference that grow fullest, and have
the greatest tendency to ascend. Particular care should be taken, we are however told, not to plant ivy in the
immediate neighborhood of young trees or hedges, as, next
to mists, nothing can be more defuctive to trees or hedge-
plants than the ivy.

It is noticed that where dry-stone walls are built, that
which we have hitherto deferred deserves a preference on account of its neatness and durability. It is not only much cheaper
than one made with flint and lime, but is equally useful,
looks as well, and admits of being practiced in many situa-
tions, where lime is either exceedingly scarce, or not attain-
able but at an enormous price. In many cases it is common,
after raising this wall to the wished-for height, to level the
top of it with loose flints, and leave it in that situation without
any coping or other security. The consequence is what
might naturally be expected, the first person who attempts
to climb over it, or the first horse or bullock that puts its
head over the top, or attempts to pull itself against it, in-
sensibly throws down a part of the flint, and in that way the
fence is gradually destroyed; whereas, when a substantial
coping of flint and lime is given, the wall is so completely
bound together and confounded at top, as to be defance
to any common injury. The copings of turf and mud, so
common in many places, are by no means entitled to appria-
bation; for though they may for a short time secure the top
of the building they soon decay, and cannot be procured
but by paring and cutting off the adjoining surface; for these
reasons, turf or mud copings are improper, even upon dry
stone walls; upon those made with flint and lime, or flint
and clay, as we shall afterwards have occasion to notice,
they are wholly to be rejected as useless.

Such persons as are inclined to raise fences of the lone
wall description, should carefully examine those that have
been built in their immediate vicinities, and afterwards de-
temine upon the modes of construction and dimensions which
may seem the most suitable and proper, under the different
circumstances, consulting thereon with proper workmen
in respect to their building, having previously their estimates,
as is the case in other forts of erections of this nature.

Stone and lime walls.—With regard to flint and lime walls, in order to render them durable, they should be con-
structed in the manner above described for dry-flint walls: that is, have a good foundation, deep enough to prevent
them from being hurt by frost, with a broad base, tapering gradually upwards. This fence, when properly
executed, is, next to hedges, the most durable of any; it is,
however, very expensive; and its superiority over the
dry-stone wall is so trifling in point of durability, as to ren-
der the latter the most eligible, it being greatly cheaper, and
answering every purpose of a fence equally well. For the
building of this wall, flites taken from the quarry are to
be preferred to the common land-flites; for though a
molin may be able to remedy, in some measure, the ineq-
ualities of surface in land-flites, by mixing plenty of lime with
them, yet experience proves, that walls made with such
flites, notwithstanding every care on the part of the builder,
are much less perfect, and last a much shorter time than where
quarried flitees are employed. This, like every other flite
fence, should be secured at the top with a substantial coping of
flint and lime; the belt and mott durable is, it is said,
that which is made with flites of the flag kind, laid to-
gether in the form here represented; the space between
them being filled with a mixture of small flites and mortar.
This coping, from its wedge-like shape, and the solid impe-
netrable surface which it presents to the weather, seems
the belt calculated of any for the preservation of the build-
ing. When a flint and lime wall is left without a coping,
which is too often the case, the moilite finds its way readi-
ly into the heart of it; it is, besides, liable to all those ac-
cidents already mentioned in speaking of dry-flint walls,
when they are left without a coping. When flint and lime
walls are built, the feature of the year at which the work is
done is none of the least important considerations; for if
they are erected either at a late period of the autumn, during
the winter, or very early in the spring, the frost acting
upon the moilite contained in the lime will separate and
diftribute its parts, and by that means destroy the cohesion of the
building; the binding power of the lime, in such cafes,
is entirely lost, and when summer arrives it resembles dry
sand mixed with the flites. Late in the spring, during the
summer, or early in the autumn, seems to be the most pro-
per time for building flitee and lime walls; at any, or all of
these periods, there is every prospect of the lime drying pro-
perly, and not the smallest risk of its binding quality being
hurt by the effects of frost, or other causes of that na-
ture.

Galloway dike, or wall.—The Galloway dike, as has been
already noticed, owes its name to the circumstance of its
being first used as a fence in that part of the country. It
is now, however, very common in most parts of Scotland,
and in some of the English counties. It is principally em-
ployed for enclosing high grounds that are destitute of
sheep, for the confining of which it seems well calculated.
From two feet to two and a half at the bottom, it is built in
a regular, compact manner, with dry flites, in every
respect.
FENCE.

Fence. The advantage the is may different an proper is foon as over the wall on each side. Above these flat stones is laid a curfe of rugged round ones, placed upon each other in a way secure enough to give stability to the building, but at the same time to open as to leave a considerable vacuity between each, by which means a free passage is afforded to the light and wind, which blows through them with a violent whistling noise. This rough open part of the building is generally raised three feet above the regular part of it, gradually tapering upwards, till it terminates in a top of about nine inches high, every course of the rough stones being thinner than that immediately beneath it. The tottering appearance is well calculated to prevent sheep, cattle, or other animals from approaching it, that it is seldom indeed that any attempt is made to keep over it. This circumstance, together with the ease with which the stones are procured, in most situations where the Galloway dike is used, render it a valuable fence. The expense of erecting it will be very different in different situations, according to the ease or difficulty of procuring stones, the price of labour, in the country, and other circumstances. In many cases where the fields to be enclosed are inclosed with large stones, the demand of which ought always to be a previous step in every plan of improvement, the incline may be made for a trifle, merely for the expense of manual work. In no instance can it be dear, and in most situations, where the confinement of the flock, or the partition of a crop, are the sole objects, this will be found to answer the purpose equally well, if not better, than more expensive fences. It has, however, one defect, it is observed, in common with all other stone fences, viz. that it neither shelters nor ornaments the country; indeed, in point of shelter, it is the most defective of any; for compact stone walls, of a proper height, are capable of affording considerable shelter to the grazing flock in stormy, inclement weather, an advantage which cannot possibly be expected from the Galloway dike, on account of its openings. On that account it appears much more eligible for the lower parts of the country, where the land is valuable, where little shelter is required, and where the confinement of the flock, or the protection of the crop, are the sole objects to be considered in the business.

The advantages of stone fences of every description are, it may be remarked, very considerable; they not only form complete inclosures at once, and by that means allow the proprietor to enter into immediate possession of every advantage that can arise from the inclosing of his fields, but by the little room they occupy, a considerable proportion of land is saved that would have been occupied by some other fences; and even that proportion of soil near the sides of stone walls, which is at present, for the most part, waste, admits of being profitably employed, either in raising grain, potatoes, or other vegetables; and the walls, as we have already observed, may be usefully employed in rearing of fruit-trees, or the different kinds of currants, gooseberries, &c. To these benefits we have, however, to oppose some defects. The belt and most substantial fences of this description are perilable in a greater or lesser degree, according to the materials of which they are made, and the judgment shown in their construction, and, after a certain time, require considerable attention and expense to keep them in repair; the shelter they afford to the flock, crop, or pasture, is also small, and in place of improving the fence they are injurious to it. This description of fence is shown at Plate XXII. fig. 1.

Stone and clay walls.—In the construction of walls of stone and clay, the clay is used like lime, and is meant to answer the same purpose. It requires fewer materials to convince intelligent persons, that a wall made with such materials, in the usual way, cannot but be an ordinary one; for if the clay made use of in building the fence has been very moist, the summer's heat will dry it so much, as to leave considerale shams in the building; these shams must necessarily deprive many of the stones of that support which they require, and in that way endanger the building. This, however, is not the only inconvenience with which this kind of wall is attended; the effect of the sun upon the clay parches it to completely, that when the wet weather commences about the end of autumn, it absorbs the moisture like a sponge, and if it is overtaken by frost while in that state, the fabric swells, bursts, and tumbles down. Even with the very best coping that can be given it, a stone and clay wall will, it is remarked, always be considered as a very exceptionable fence, as, however well it may be defended at top, the moisture will penetrate at the sides; if it is left without a cope, however, or is only coped with mud or sod, the evil will be greater, as the moisture will, in that case, find a ready passage downwards, and in that way accelerate the destruction of the wall or fence.

And walls of stone and clay, daubed with lime differ in no respect from that just now described, except in the harling or daubing that is given them. Where that operation is well performed, and at a proper season of the year, the coating of lime, by preventing the entrance of moisture, will add greatly to the durability, as well as beauty of the wall; so much so indeed, that some fences made in this way, when the clay was properly tempered, and did not contain too much moisture, and where a harling or daubing of lime was afterwards given, have been known to last nearly as long as walls made entirely from stone and lime. The durability of this, as well as the foregoing fence, however, depends upon its being properly coped or covered at the top with some proper material.

Dry stone walls lipped with lime.—These differ from the ordinary dry-stone walls in having about two or three inches of them on each side lipped with lime, which gives them the appearance of being built entirely with stone and lime. Where the external appearance of a fence is an object, something is gained by this practice; in point of real duration, however, they seem to possess very little advantage over the common dry-stone walls, which, when properly executed, last equally long with them.

Dry stone walls lipped and harled.—These are much the same, nothing more being added than a harling or daubing of lime after the other work is finished; this addition is to be considered merely as an improvement upon their appearance, and not as contributing to increase their utility, or render them more durable as fences.

Dry stone walls paved and harled.—These are much the same; the mason only carefully paves or fills up all the interstices of the building with small stones, after they have been built in the ordinary way, and afterwards daubes or harles them over with lime. The paving, by filling up every vacant space, and affording complete support to the stones in every part of the surface, adds considerably to the durability of the building, and the harling afterwards gives the whole a finished, substantial appearance, which renders them at once agreeable to the eye, and lasting as fences.

Dry stone wall, with light palings upon the top.—These are
are sometimes made, and for particular purposes answer well, and have a handsome appearance when well executed, but they are expensive. This sort of fence is shown at fig. 2, in the plate.

Brick walls.—These sorts of fences are seldom had recourse to for ordinary inclosures, except in situations where stones are extremely scarce; as is the case in many of the English counties, for pleasure grounds, or for garden walls. Where brick walls consist of bricks only, they are built either with the brick on edge, in bed, or acros. When the wall is built with bricks on edge, they are laid up with the edge or narrowest part of each applied to the other, and the thickness of the brick in such a case constitutes the thickest part of the wall. When brick in bed is used, the bricks are laid flat, and the thickness of the wall is proportioned to the greatest breadth of the brick. When they are laid acros, the thickest part of the wall is then equal to the length of the brick that is employed for the purpose.

It may be obviated, that the most valuable use to which bricks are applied, is either for facing walls built with coarse stones, for gardens, or for heightening old stone walls; for the first purpose they are an excellent article; and any wall erected with brick, is, for the purpose of rearing fruit trees, of equal value with one of the most expensive hewn stone. Where it is intended to heighten a stone wall that is too slender to bear a heightening of stone, or bricks either in bed, or on edge, will answer the purpose very effectually, without rendering the wall too heavy. It is to be noticed, however, that in every case, either where a wall is made entirely of brick, or heightened with it, there will be a necessity for strengthening it at the back with pillars at certain distances from each other, as represented at figs. 3, and 4, in the plate. These will add to the stability of the building, and, if properly executed, will render it equally durable with a stone wall. For hot walls they are very valuable, as they not only, by their numerous seams, allow the trees to hectar regularly and neatly trained, but are at the same time extremely convenient for shaping the flues that conduct the heat. Where the price of labour is low, and clay of a proper quality, together with fuel, can be easily obtained, bricks may be used with advantage for almost any purpose where stone is at present employed: we believe, however, that their use will be chiefly confined to the facing of garden walls, to the walls of hot-houses, to hot-walls, or the heightening of old stone walls; in all of which they will be very valuable, and well, at a small expense, answers the same purpose as stone that has been prepared by hewing. From the increased duties upon them they are now become, however, by no means a cheap material. A wall constructed with bricks is shown at fig. 5, in the plate.

The copings of walls of this description are formed in various ways. In some instances they are made with common brick set up in such a manner as to form an angle upon the top; in others, with a sort of tiles resembling the letter A, flat below and angular above, with a border projecting a little over the wall on each side. In many parts of the kingdom this sort of coping is found to answer the purpose very effectually; in some cases it is, however, made quite flat, but which is disapproved of; on account of its not affording sufficient protection to the moisture, which is apt to hang upon it for that reason.

Frame wall.—It is a kind of wall which is constructed in the following manner: a frame of deal boards, of a width and height suited to that of the intended fence, is formed and placed upon the line in which it is designed to be made, the foundation having been previously dug in a proper manner. This frame is then filled with stones of all sorts, gathered mostly from the neighbouring lands; and, when filled in this way to the top, a quantity of liquid mortar is poured in amongst them, sufficient to fill up every interstice, the whole being suffered to continue in that state until it is supposed that the mortar has acquired a proper degree of firmness to give flability to the building, which, in the dry summer season, will not be longer than a day or two. The frame is then removed and placed a little further on the same line, in such a way, that one end of it may join immediately with that part of the work from which it has been removed. In this way the frame of fence is gradually completed, which, when the lime has been well tempered, and the proper pains taken to incorporate it with the stones, presents a smooth uniform surface, and has the appearance of being a firm substantial fence.

Turf walls.—Fences of these kinds are common in most of the hills and upland situations of the kingdom, being found convenient for temporary purposes. They are frequently used for inclosing fields in particular districts, being had recourse to in an extensive manner; while, in others, they are employed for the forming of pens, folds, and other places for confining different sorts of live stock during the winter season. In common they are made simply of turf, which is pared off from the adjoining surface, and used without any mixture of earth; but in other cases the wall consists of a facing of turf on each side, while the space between is filled up with loose earth.

For inclosing, when durability is required, this is a sort of fence that can never, however, be had recourse to with propriety, as, from the very moment it is finished, its decay commences, and no pains or attention will be able to keep it in repair, after it has stood two or three years: in very exposed situations, however, it may be useful as a protection for young hedges during the first three or four years of their growth; but, as a wall of this kind can in no instance be made without a great destruction of the adjoining surface, which, upon good land, is a serious loss, the protection of young hedges will be answered equally well by low stone fences, which, while they perfect the inclosure, will, at the same time, shelter the young plants, and clear the field of the stones it may be incumbered with. This sort of turf fence is shown at fig. 6, in the plate.

Stone and turf walls.—These are also very common sorts of fences in many situations, where better and more durable ones could be made at equal, perhaps less, expense. In many instances, however, they are had recourse to from necessity, where lime is either very dear, or not attainable at any price. The stones used in the construction of fences of this kind are in general the ordinary land-stones; with these, and the turf taken from the adjoining surface, the walls are made, using alternate layers of each. For temporary purposes this sort of fence may be adopted in almost every situation, as it is ranged at small expense, and the materials are everywhere to be met with almost without trouble; but in all cases where permanent fences are wanted this will be found very deficient and inferior even to the common turf-wall; for, by the intervention of stones between every layer of turf, the sod is dried, the plants die, the turf, as might naturally be expected, soon decays, and the wall crumbles down; whereas, when it is built entirely of turf, with a sloping bank of earth behind, the herbage continues growing, and the whole turf, of which the wall is made, soon consolidates into an uniform green sod, which, with proper care, will last a considerable length of time. A fence of the stone and turf kind is shown at fig. 7, in the plate.

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Mud-walls, with a mixture of straw.—These kinds of walls are very frequent in many parts of England, not only for surrounding their small enclosures and back-yards, but also for constructing the walls of many of their farmhouses, cottages, and offices. In North Britain they are used also for similar purposes, and for sub-dividing houses into different apartments, for which purpose they answer equally well as lath and plaster, and are nearly as durable. They are a sort of cab-dab fences.

It may be remarked that, when either the outside walls, or the inside divisions of a house, are made of these materials, the cement is to take a small quantity of straw, and incorporate it with a sufficient proportion of clay; the straw in this case answers the same purpose as hair in plaster-lime. When a sufficient number of these are made, the work is begun, by laying a flat at the bottom of the intended wall; when this is done, and the different pieces firmly kneaded or wrought together with the hand, a flat deal board is applied on each side, which being properly prized and rubbed against the buildings in a horizontal direction, not only serves to consolidate the work, but gives it a degree of firmness and uniformity: successive flats are added till the wall is raised to the intended height, taking care to taper it gradually upwards. Walls made in this way, if properly constructed, will last for many years, and if dashed or hardy lime, at a proper season of the year, will have an appearance no way inferior to such as are made with stone and lime, along with this addition to their appearance: the harding or dashling with lime if properly done, will, by preventing the access of moisture, render them much more durable. When walls of mud and straw are to be made, pieces of wood, properly joined and secured, should be set up in the direction in which the fence is to run. These should be in the form of a double paling, and calculated to answer the same purpose as the standard employed in making brick divisions in a dwelling-house; the upright parts should be placed in such manner as to be immediately opposite to each other, and at a distance equal to the thickness of the wall. These standards will not only render the fence firm and more durable, but, at the same time, serve as a direction to the workmen in keeping it of a regular thickness and shape. In England, where flanes are scarce, and in many of the counties not to be had, walls of this description are the sine qua non for many purposes, and when, properly constructed, last a considerable time; but in every instance where flanes are procurable at a reasonable price a fence made with them is greatly to be preferred, as it is in general built with less trouble and expense, and is at the same time more firm and durable. At belt it is, however, of a very perishable nature, and the great expense required to keep up such fences has long since taught both proprietors and occupiers that they are by much the most expensive of any. Fig. 8. displays a fence of this nature.

In the constructing of all sorts of flane walls, it is of essential consequence that they be carried up in a regular manner, which is best performed by having recourse to a proper plumbing frame. One which has been found to answer this purpose perfectly is represented at fig. 9. in the plate.

In the raising of both single and double flane walls, it is a matter of great importance to give them a proper tapering form upwards, or what the workmen call "batter," which is gradually narrowing them as they rise in height. This is usually done in the proportion of about one inch to every foot in height on each side, which is distinctly shown in the section of a dry flane wall given at fig. 10. in the plate.

It is a matter of very great importance to the proprietors and occupiers of land, that the fences of farms, whatever their nature may be, should be in a good condition, and well kept in repair, as without attention in these different respects serious injures must be constantly fulfilled by them. The most convenient and easy method of effecting these ends is, probably, that of annually going over a certain extent of them, in proportion to the nature and size of the farm, as, by such a practice, there will never be more to be done in any one year than can be easily accomplished. See Inclosing of Land, and Canal.

Fence-Month, (mensa prohibitionis, or mensa vetitum,) is a month wherein the female deer fawn; for which reason it is unlawful to hunt in the forest during that time.

It begins fifteen days before Midsummer, and ends fifteen days after, being in all thirty days.

There are also certain fence or defence months, or feasons for fish, as well as wild beasts, as appears by flat. Welln. 2 cap. 13. in these words:

"All waters, where salmons are taken, shall be in defence for taking of salmons, from the nativity of our Lady, unto St. Martin's day. And likewise, young salmons shall not be taken or destroyed by nets, &c. from the midst of April, to the nativity of St. John Baptist," &c.

FEN-CHOUI, in Geography, a town of China, of the third rank, in Tche-kiang; 25 miles N.N.W. of Yen-tee-hou.

FENCING, the art of defence, or of using the sword, to wound an enemy, and preserve one's self from his attacks.

Fencing is one of the exercises learnt in the academies, &c.

The art of fencing is acquired by practising with foils, called in Latin rudes; whence fencing is also denominated gladiature rudaria.

Pyroard affirms us, that the art of fencing is so highly esteemed in the East Indies, that none but princes and noblemen are allowed to teach it. These masters wear a badge or cognizance on their right arm, called in their language esarf, which is put on with great ceremony, like the badges of our orders of knighthood, by the kings themselves.

Montaigne informs us, that when he was a youth, the nobility all shunned the reputation of being good fencers, as something too subtle and deSigning, and apt to corrupt virtuous manners.

Fencing is divided into two parts, simple and compound. Simple is that performed directly and nimbly, on the same line; and is either offensif, or defensif. The principal object of the frst is whatever may be attempted, in pushing, or making parries, from this or that point, to the most uncovered part of the enemy. The second consists in parrying, and repelling the thrusts aimed by the enemy.

The compound, on the offensive side, includes all the possible arts and inventions to deceive the enemy, and make him leave that part we have a design on, bare and unguarded, upon finding we cannot come at it by force, nor by the agility of the simple play.

The principal means hereof are feints, appeals, or apples, which confin in a sudden beat of your blade on the contrary side to that on which you join your adversary, and a quick disengagement to that side again, clashing, and entangling, of the swords, half-trifles, &c. and in the defensive, to push in parrying.

The proper attitude in fencing is to hold the head upright, though the body hath an inclination forward on a longer, and all the weight rests on the left haunch when on guard. The
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The feet, hand, body, arm, and sword, must lie to the line. For an explanation of other terms in this art, see the articles Bayesian, Caveating, Flanxade, Glazade, Lock, Thrust, Thrust, &c.

FEND, in the Stem Language, imports the same as defend. Hence the phrase finding the best, &c., that is, saving it from being dashed against the rocks, shore, or ship's side. Hence also

Fenders, any pieces of old cable-rope, or billets of wood, &c., hung over the ship's side, to fend or keep other ships from rubbing against her; or to prevent her from striking or rubbing against a wharf or quay.

Fender Bolt. See Bottle.

FENDUE EN PAIL, in Heraldry, a French phrase, applied to a crosier, to denote it chosen down from top to bottom, and the parts from some distance from one another.

FENÊCROUSHE, in Geography, a town of Chinche Tartsy; 360 miles E.N.E. of Peking.

FENELON, Francis de Salignac de la Mothe, in Biography, the celebrated archbishop of Cambrai, and precociously distinguished among his contemporaries, was defended from an ancient family, and born at the castle of Fenelon, in Quercy, in the year 1651. The charge of his education, which, till his 10th year, was domestic, and prosecuted for some time in the university of Cahors, was afterwards undertaken by his uncle, the marquis of Fenelon, a man no less distinguished by his piety than by his valor. At an early age our Fenelon made a rapid progress in literature, and being described for the ecclesiastical profession, he became a popular preacher in his 19th year. His uncle, dreading the pernicious influence of popular applause on an youthful mind, ended with singular sensibility, placed him under the tuition of M. Tronson, the excellent superior of the congregation of St. Sulpice, who guarded him by his admirable instructions and discipline from the danger to which he would otherwise have been exposed. Between the pupil and the preceptor, in this state of seclusion from the world, an attachment was formed which terminated only with their existence; and it appears from letters that are extant how highly he respected the guide and guardian of his earlier years, and with what grateful sensibility he acknowledges his uncle's wisdom and kind offices in placing him in a situation so favourable to his improvement both in knowledge and piety. At the age of 24, Fenelon entered into holy orders, and began to exercise the most laborious offices of his ministry in the parish of St. Sulpice. During his residence in this school of genuine and elevated piety, for such it was at the period to which we refer, his ardent mind formed and cherished a design, which some may probably conceive to be romantic and extravagant; for it was nothing less than that of joining the million to Canada, with a view to the instruction of the barbarous natives in the truths of the gospel. This project, however, being defeated by the authority of his uncle, the bishop of Sarlat, he was advised to be fixed on a similar employ in the Levant; but this design was never executed. An occupation somewhat analogous was found for him by M. de Harlay, archbishop of Paris, who, apprized of his disposition and character, named him superior of the New-Catholics, and of theiders of Magdalen of Trifinial, while he was yet only 27 years of age; an employment which was usually entrusted to ecclesiastics of mature experience, and who had grown old in the most delicate functions of the ministry. The object of this institution, in which the idlers were bound by no vows, was to confirm the new converts, and to supply instruction to those who were defectives of becoming professed. The recent conversion of M. de

Turenne, and the well-known disposition of Louis XIV. had given fresh celebrity to this establishment; and, therefore, de Harlay was induced to look out for a distinguished person as its superior, and to fix on the abbé de Fenelon. His present situation, and the duties connected with it, coincided with his original views, and he engaged in the discharge of them with peculiar satisfaction. Without encountering equal dangers of a personal kind, the task which he had to perform was not less dangerous; "for it is," as he himself says, "often more difficult to triumph over error than idolatry, and to eradicate opinions which have been adopted as being more pure and correct, than to dispel pernicious extravagances, which neither seduce the mind nor gratify selfish love." About this time, in consequence of the recommendation of his uncle, the marquis, Fenelon formed these connections, to which were owing his future high elevation, and the singular perfections and virtues which it was his destiny to undergo. He was introduced, among others, to the duke de Beauvilliers and Bourbon, the latter of whom directed his studies, and manifested every token of esteem for him; though he afterwards proved his most inveterate enemy. It was also about this period that the bishop of Sarlat resigned, in favour of his promising nephew, the canonry of Caronde, worth from three to four thousand lives a year; the only prebend that was enjoyed by Fenelon till he reached the age of 44 years. Ten years of his life were occupied in superintending the community of female converts; and in this delicate situation he conducted himself not only imprudibly, but with the highest degree of probity and honour. At this time he was in the chief intimacy with Bourbon; and was recommended by him to Louis XIV. as a proper person to be employed in converting the febraries of Pottou and Saintonge. This mission formed a part of those obvious measures by which this monarch was led to believe that he should annul professed papal authority in his dominions; and we cannot but regret that such a character as that of Fenelon should be implicated in this detestable business. His conduct, however, in the execution of it, furnishes caufe for admiration. Before he embarked in this perilous scheme of his foreign, he petitioned, that the troops and all the trappings of war might be removed from the districts within his mission. The request was granted, and he, together with his companions, who were selected from families of rank, proceeded to the scene of their labours. Great success seemed to attend them; the adherents of Fenelon flattering themselves with encouraging prospects; but the more differing Abbé was not to be deceived by false appearances; nor would the ingenuousness of his mind allow him to countenance impositions. He candidly states, that during, and considerations merely human, occasioned most of the conversions; and that it was to no purpose he had acted all the apparatus of war to be removed from the view of the terrified multitude, since the relations of vipers committed in other provinces had filled them with alarm. "Were it proposed to them," he says in a letter to Bourbon, "to abuse Christianity and fol\n
ow the Koran, you have only to show them the Dragons?" Fenelon, seemingly suspecting that at least the immediate effects of his zeal and exertions were the reverse of beneficial, became weary of his employment; and he was in a little while recalled. Upon his return to Paris, he preached frequently, and cultivated an acquaintance with perfons of known religious character; and by the graces of his elevation, and the gentleness of his disposition and manners, acquired increasing reputation. This indeed was a period of the greatest interest in the life of Fenelon. The duke of Burgundy, eldest son of the Dauphin, had attained an age

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which
which required the superintendence of a governor. Louis XIV. appointed to this office the duke de Beaumarchais, a nobleman eminently distinguished for his virtue and piety, and highly respected by the king, who entrusted him with the nomination of all the persons who were required to concur in the young prince's education. The duke, on the day preceding that of his own appointment, proposed to the king, and obtained his consent, that the Abbé de Fenelon should be preferred. At this time, viz. September 1689, while persons appointed to their respective offices in the education of the young prince commenced the fulfilment of their duties, Fenelon was no more than 38 years of age. Yet, it is said, was an infallibility of union like that which reigned among the instructors of the duke of Burgundy. They had but one heart and soul, and the soul was that of Fenelon.

Fenelon was fully conscious of the importance of the charge that was committed to him; this was the education of the future head of a monarchy, which had reached the highest splendour—the absolute master of twenty millions of men, whose happiness or misery would depend on the personal character of the sovereign. Nor was he unappreciated that the nature of the youth, whom he was appointed to instruct, was extremely unpromising. History represents the duke of Burgundy as displaying in infancy all the symptoms of a pernicious nature—an invincible obstinacy, a revolting pride, irrepressible propensities, and the most violent passions, are described as its odious features; but they were joined with a great capacity for acquiring all kinds of knowledge. "He was born terrible," says St. Simon, "his behaviour made all who beheld him tremble." By various means, happily combined, by a continued series of appropriate and pertinent observations, by patience, gentleness, and unpremeditated attention, the preceptor at length succeeded in gradually breaking the violent character of his pupil, and in calming his impetuous passions. Beaumarchais and Fenelon directed all their solicitude and exertions to realize this design; they succeeded, and were remunerated for it; for history shows, that all of the princes, he who was the least flattered by his instructors, and to whom the most harm and cutting truths were told in his infancy and youth, retained the most tender regard for the virtuous persons who presided over his education. Of the talents, fidelity, and affability of Fenelon, as a preceptor, we may form some judgment by the alonning proficiencies of the royal scholar. At the age of ten, we are told, the prince wrote Latin with elegance, and translated the most difficult authors with an exactness and a felicity which surprised the best judges; he was perfectly master of Virgil, Horace, and the metamorphoses of Ovid, and was sensible to the beauties of Cicero's orations. At eleven, he read Livy throughout, and began a translation of Tacitus, which he afterwards finished. The Abbé Taurin, attesting these facts, says, that his mind was of the first order, and that he was not contented with superficial knowledge, but sought to penetrate to the bottom of every thing; his curiosity was immense. Great pains were also taken with regard to his religious education; and one of the biographers of Fenelon claps the relation of various circumstances that respect the attainments of the young prince with skilful, "What must we think of instructors who were able to bore the mind of a youth of 14 with all that is essential in religion, whether we regard its doctrines or its history; with all that most excites in mythology, and which supplies the principal subjects of literature and of the fine arts; and with all the leading facts of ancient and modern history? He had been taught with precision the elements of several other sciences. It was not easy, said the estimable and correct Abbé de Fleurty, to find in the whole kingdom, not merely a gentleman, but any man, better informed than the prince. At 18, his letters were cited for the safe and good taste which they displayed. This testimony was borne to them by Madame de Maintenon. The accounts of the talents and attainments of the prince, we are told, surprised even Boileau, who had a great difficulty of such eminent genius, and a secret jealousy of the rising fame of the preceptor; and he took an opportunity of satisfying himself by an interview and examination.

The services of Fenelon in the education of his pupil were rewarded, in 1695, with the splendid preferment of the archbishopric of Cambrai, which included a dukedom. But this he accepted on condition that he should be allowed to devote nine months in the year to his fee, and three to the princes; and at the same time he resigned a valuable abbacy. At the moment of his elevation to one of the highest dignities of the church, a storm was gathering which could not less than alarm his tranquil mind. The reputation of Fenelon, and the ascendancy which his attractive and commanding qualities seemed certain of obtaining, alarmed the jealous mind of Boileau. The unsuccessful preceptor of the father could not hear with indifference the applause which all France bestowed on the preceptor of the son; nor listen without envy to the accents of gratitude which echoed from every corner of the realm to the man whom the people revered as the soul of a wise and beneficent reign. Although Fenelon never refused submission to Boileau in matters of religious doctrine, this would not suffice. The latter found, that if he did not pull down Fenelon, he must see himself eclipsed; and hence he became his relentless persecutor. The dignity of Fenelon is the real object; but the interests of religion are the slender pretence; no tie, human or divine, restrained the prelate of Meaux; but confidence, honor, decency, all were set aside, that the ruin of his rival might be accomplished. In order to effect this plan, Louis XIV. must act the part of an abject tool, and Madame de Maintenon be guilty of base treachery; venerable prelates must contravene their solemn acts, and degrade and disfigure themselves; the Abbé Boileau, the prelate's own nephew, and another ecclesiastic, must circulate the grossest falsehoods and the odious calumnies; the court must facilitate, and throw on the wide world, most meritorious characters, in order to terrify Rome, and influence it in its judgment; the empty pompous monarch must bully the pope; and the fee of Rome itself must be vilified, and pronounce a decision against its judgment, to infure a nefarious triumph to the bishop of Meaux over the archbishop of Cambrai. A festivity of a tribunal, which his arts and practices had degraded at the expense of the costly facrcities, already enumerated, inflamed against his adversary; but the tribunal of the public avenged the injustice; and the genius of Fenelon secured a victory to his innocence, in which dilant empires, and succeeding generations have felt participation and joy.

The origin of these differences between the two prelates must be traced to the connection formed by Fenelon, at a preceding period, with Madame de Guyon, and to his having afterwards adopted and defended her peculiar sentiments. (See Guyon.) When they were first announced, Fenelon had conceived prejudices against them, but on his return from his mission into Poitou, he had the curiosity, on passing near Montargis, to pay a visit to M. Guyon, and to inquire into her course of life. The report he received was very favourable, and the statements that were made to him of her piety and charity removed his prejudices, and induced him to imbibe her mystical tenets. Indeed, Fenelon seems to have had an early taste for mystical devotion, and to have particularly
partially flushed the writings of those who cherished it. On further acquaintance with M. Guyon, he was confirmed in this predilection. But when the "quietism" of this devotee excited attention, and became a subject of conversation and inquiry, Fenelon advised her, as it has been supposed, to submit her doctrine and conduct to the judgment of Bossuet, who is said to have treated her with great kindness, and to have gained her confidence to such a degree, that she put into his hands her printed works, and also a manuscript life, containing many extravagances; though she had never placed the same kind of confidence in Fenelon. Bossuet, however, being diffident, the demand to be judged by committees; and the bishop of Chalon, and M. Tronfon, director of St. Sulpice, were added to the bishop of Meaux, in order to examine her case; and with them was afterwards associated Fenelon, on his elevation to the see of Cambrai. These commissioners met at Illy, the country-houle belonging to St. Sulpice, and discussed the tenets of M. de Guyon; and as Bossuet was an entire stranger to the mystical writers, he declared Fenelon to supply him with a selection of them, and in order to aid his judgment, "the archbishop of Cambrai furnished him with comments and remarks. Those comments and remarks first excited the orthodox prelate's suspicion of the other's partiality to their principles and maxims. Indeed, Fenelon avowed and defended his doctrine of the divinely inspired love of God, without any reference to eternal happiness as a reward; while Bossuet contended that a reference to the reward was a specific motive to it, and hesitated to pronounce that Fenelon's notion was erroneous. After the conference at Illy, Bossuet had employed himself on a work which was intended to demolish "Quietism," and which he entitled "the State of Prayer." When M. Guyon was arraigned, Fenelon resolved not to become a party to the publication of this work, though Bossuet had previously defined it, nor to give it his testimonial. He also induced Madame de Maintenon, the bishop of Chartres, and the cardinal de Neufles, to approve his refusal, on condition that he should publish a tract on the points in dispute, in which he should state his own opinion. This agreement produced the famous book which was the cause of all his troubles, viz. "The Explanation of the Maxims of the Saints," 1697. With Bossuet for an enemy, and M. de Maintenon and the king adverse to him, it was difficult for an honest man to write a treatise which should stand the test of orthodoxy; but having fulfilled an impediment engagement, Fenelon submitted his composition to the cardinal of Noailles, the bishop of Chartres, M. Tronfon, and other theologians of high authority, admitting all their corrections; and all these persons not only approved it, but some of them highly commended it. Thus fortified, the book was delivered to the public, and it must be owned that it met with universal disapprobation. Bossuet was his most malignant adversary, and flirred the court, not partial to Fenelon before this event, and the whole court against him. The prelates of Paris and Chartres, and the other divines who had given their function to the "Explanation," joined in the cry against the book. The archbishop, thus overpowered by his pernicious friends and open enemies, was banished to his diocese. About this time his palace at Cambrai, with all its furniture and books, was consumed by fire. He sustained the loss with unexampled firmness and tranquility: for when news was brought him of the catastrophe, he observed, "That it was better all these should be burned, than the cottage of one poor family." Bossuet perfumed in his enmity, and determined to force Fenelon absolutely to retract the errors of the work which had caused such an alarm and outcry. Fenelon, on the 27th of April, 1697, referred his publication to the judgment of the pope; and declining the conferences which Bossuet proposed, he adhered to his purpose of appealing to Rome. In the mean while his enemies pursued him with imputable violence; and he received a mandate from the king, dated August 1, 1697, commanding him to retire to his diocese, and there to remain. Every measure was adopted, which the malignity of Bossuet could suggest, for enforcing a sentence of condemnation at the court of Rome; till the length of the reluctance of that court was overcome, and Pope Innocent XII. was prevailed upon, in 1699, to issue a brief of censure against Fenelon's work, and 23 propositions extracted from it. The archbishop himself drafted them; and a profound submission to the sentence of the holy see, read his own condemnation from the pulpit, and composed a "mandement" against his book. He even caufed to be reprinted, for the expiation of the sacrifice a fun borne by two angels, one of whom trampled under foot some heretical books, among which appeared the title of his own. This was almost, as a man of wit called his conduct on the occasion, "the coquetry of humility"; but it had, however, all the appearance of sincerity, and his whole after-conduct was comparable to it. When the news arrived of the condemnation of his work at Rome, he was preparing to mount the pulpit; and to deliver a discourse suitable to the solemnity of the day, which was the festivity of the Annunciation; but after a few moments of recollection, he changed his purpose, and made his discourse turn solely on the sublimity which is due to superiorities. His numerous audience had been previously apprized of the fact; and the admirable presence of mind, the self-command, and the religious calm, which he displayed, fulfilled every expectation with tears of sympathy, respect, and admiration. So highly pleased was the court of Rome with the observation of the archbishop of Cambrai, that the whole college of cardinals petitioned the pope to send a complimentary letter in his own name to the pious and venerable prelate; but the Abbé de Meaux no sooner heard of this design, than he caused the papal epistle to be frittered down to a few cold expressions of regard. So amiable, indeed, was the whole department of Fenelon, that a celebrated writer paid of him, "I know not whether Fenelon was a heretic in affecting that God ought to be loved for himself, but I know that Fenelon desired to be so loved." In his diocese he united the characters of a nobleman and of a Chriftian pater. In the latter capacity nothing could surpass his simplicity of manners, his chastity, his minute attention to all his duties, his fervent piety united to indulgence and moderation. He visited the cottages of the peasants in the most condescending manner, and administered consolation and relief in their distresses. When they were driven from their habitations by the alarms of war, he received them into his house, and even ferved them at his table. To one of his clergy, who assumed merit to himself for having abolished the Sunday dances of the peafantry in his parish, he said, "M. le Curé, let us not dance, but let us permit these poor people to amuse themselves; why should we hinder them from forgetting for a moment how wretched they are?" His hospitality was boundless, and bleded with the most genuine politeness. During the war his house and table were open to all officers, many of whom, when sick and wounded, he lodged and provided with every kind of necessary relief. Besides his conftant hospitalities to the military, he performed a most munificent act of patriotism after the difatrous winter of 1695, by opening his granaries, and distributing gratuitously to the soldiers corn to the value of 100,000 livres. M. n. 2
We may reckon it among the most pleasing anecdotes of modern war, that the duke of Marlborough, and the other generals of the allies, when in possession of that part of Flanders, expressly exempted the archiepiscopal lands of Cambray from all pillage or exaction, regarding them as devoted to the purposes of common benediction. They frequently paid their respects to the worthy prelate, and always received from him the warmest intonements of esteem and admiration. Among the illustrious visitors who returned to Cambray to render homage to its venerable archbishop, was "The Young Pretender," and from the conversations of Fenelon with this prince, it appears that the prelate was a warm admirer of the British constitution. When he advised him, if he should ever regain the throne of his ancestors, never to constrain his subjects to change their religion, he says, "No human power can force the inextinguishable tracings of the freedom of the mind. Violence can never persuade men, it only makes hypocrites. When kings interfere in matters of religion, instead of protecting her, they reduce her to slavery. Give to all, then, civil liberty; not as regarding every thing as indifferent, but as enduing with patience what God permits." Referring to the political constitution of the state, he asks, "Is not the sovereign sufficiently powerful? If we say that the king can do nothing without the parliament, is not a monarch happy who is at liberty to do all the good which he wishes, and has only his hands tied when he would do wrong? Every wife leaves with her husband, not only more than the executor of the laws, and to have a supreme council to moderate his authority," with much more to the same purpose.

The French courtiers were afraid of being known to visit a person lying under the displeasure of their master. This was actually the case; and an incident had happened which placed an infamable mark on the restoration of Fenelon to court favour. Besides his delinquency in point of orthodoxy, Fenelon had been guilty of writing "Telemachus," a work which was denounced to the jealous monarch, Louis XIV, as a most daring satire on his reign. Indeed he had never heartily approved of his appointment to be the preceptor of the princes, regarding him rather as a "bel esprit," than a man of the world; and the maxims of Telemachus confirmed him in this opinion. Telemachus saw the light through the infidelity of a servant, who, judging highly of its value, took a copy for himself, whilst he was transcribing it by the archbishop's order. This MS. he sold to a bookseller; and thus was given to the public a performance that secured a degree of fame to its author, which he did not anticipate, and involved him in sufferings which he did not merit. However, he flapped the impudence of the work which was going on from a copy thus surreptitiously obtained; and, after the death of the duke of Burgundy, he burned every manuscript of the preceptor which he found among his papers. Besides the offence which Telemachus gave to the king, he had also offended beyond forgivenesses Mad. de Maintenon, by his honiell advice to the king, when confuted, not to marry her; advice which his majesty had the meanest to betray. The enmity of Louis, arising from these and some other circumstances, may be inferred from the pains which the duke of Burgundy was obliged to take, in order to renew his communications with his preceptor. After four years' silence from the period of the archbishop's disgrace at court, a correspondence began which terminated only with the death of the prince; no less honourable to himself than to his preceptor.

After the death of the Left Dauphin, and the great change which consequently took place in the situation of the duke of Burgundy, Fenelon conceived it his duty to address new councils to his pupil. He is no longer Mentor, whose gentle and paternal voice teaches the young Telemachus how to reign in the small city of Ithaca, but the pontiff armed with the power and the majesty of religion, who reveals, in the name of heaven, to the heir of a great empire the fearful duties imposed on him. While flattering courtiers and tending ministers flattered only of his power, and the splendour of his supreme rank, Fenelon, in his sublime but sincere letters, traced great dangers and great duties. "It is time," says he, in a letter written to his pupil on this occasion, "to render yourself beloved, respected, and esteemed; to become the counsellor of his majesty, the father of the people, the confidante of the afflicted, the support of the poor, the ray of the nation, the defender of the church, and the enemy of innovation. Let flatterers be kept at a distance, and no confidence be placed in them; let merit be distinguished, fought, anticipated, and employed; listen to everything, but believe nothing without proof; and learn to excel all, since you are placed above all. Be the father of your people, and not their master. All must not be for one, but one ought to be for all, to ensure their happiness." The reputation of the pupil reflected the highest credit at this period on his preceptor; it spread from Verailles to the extremity of France; and Fenelon began to enjoy the fruits of his exertions and cares. Fenelon, considered on a religious period, enjoyed the satisfaction of considering that his counsels had never any other object than the prince's glory, and the good of the people whom he was to govern. In this great change of affairs, and which so materially affected the situation of Fenelon, he never diverted his thoughts to himself. However, the ambitions now courted the excellent prelate; and the spring of 1711 produced clear proofs of the change which had taken place. Cambray became the road to every part of Flanders. Yet with all this attention on the part of courtiers, he conducted himself with so much modesty and so much prudence, that he did not awaken the royal jealousy; prone enough to be excited, and to take offence. As soon as the duke of Burgundy appeared in arms, and took a part in public affairs, the good archbishop became by turns a general, a diplomatist, and a minister; and discerning persons cannot fail to be highly struck with this amazing versatility, and with the excellent counsels which he imparted in each character. According to the plan of government, which he prepared for the consideration of his pupil, and the leading arrangements of which he drew up in the form of tables, enrollment into the army was to be voluntary, and the service was to be for five years.—All offices were to be discharged by principals, and none were to be allowed to serve by deputy.—No reversion of places were to be granted.—Each province was to have its states on the model of those of Languedoc; and the imposition of taxes was to be intrusted to those assemblies. The gabelle, and other oppressive taxes, were to be abolished, and such as were more equal to be sublimated in the room of them. The Eftatus-General were to be revived, and to be assembled every three years. They were to have only the power of making representations, and the king was to decide. The courts of the feudal lands were to be abolished, and the suitors were to have recourse to the bailiff. Commerce was to be free, &c. &c. Three months had scarcely elapsed after these plans had been sketched, when the premature death of the duke of Burgundy extinguished the fanguee hopes which had been so universally indulged. When Fenelon heard the afflicting intelligence, the only words which he uttered were, "All my ties are broken. Nothing now binds me to the earth." In a letter written soon after this Iroke,
broke, he says, among other things, "God has taken away all our hope for the church and the state. He had formed this young prince, he had adorned him, he had prepared him for doing great good, he showed him to the world, and immediately he has withdrawn him from it; I am struck with horror; and I find myself thinking without any bodily complaint. In weeping over the dead prince, my heart is torn to pieces, but I am alarmed for the living."

The succeeding memoirs of his friends and admirers, the dukes of Chevreuse and Beaufres, were additional blows to his feelings and expectations. Nevertheless, the definitive state of the king's health, and the favourable connexion they entertained of him by the duke of Orleans, encouraged his hopes; all which were terminated by a fever, succeeding the accident of being overturned in his carriage, which proved fatal to him in January 1715. One of his last acts was that of writing a letter to the king, concerning the spiritual affairs of his diocese, which alone seemed to be his remaining concern. He expired in perfect tranquillity, deeply lamented by all the inhabitants of the Low Countries, and especially by the flock committed to his charge. So well had he balanced his worldly affairs, that he died without money, and without a debt. The following portrait of Fenelon is given by the duke de St. Simon in his Memoirs:

"He was a tall, lean, well-made man, with a large nose, eyes whence fire and flame flowed in a torrent; a physiognomy resembling none which I have elsewhere seen, and which could not be forgotten after it had once been beheld. It could command attention; it had both gravity and amenity, seriousness and gaiety, and equally spoke the theologian, the bishop, and the nobleman. His prevailing expression, as well as that of his whole person, was fest, sagacity, grace, decorum, and especially elevation. It required an effort to cease to look at him. His manners were corresponding; they were marked with that ease which makes others easy, with that siile and air of good company which is only acquired by frequenting the great world. He, moreover, puffed a natural, sweet, and flowing eloquence; an animating, but noble and distinguishing politeness; a ready, clear, and agreeable eloquence; a power of making himself understood upon the most perplexed and abstract subjects. With all this he never chose to appear wise or withe than those to whom he spoke, but defended in every one's level, with a manner so free and engaging, that it was scarcely possible to quit him. It was this rare talent which kept his friends closely attached to him, notwithstanding his fall; and which, during their dispersion, enabled them to talk of him, to regret him, to long for his return, and to unite themselves to him more and more." The principal works of Fenelon are as follow; viz., "Sur le Ministère des Pâtres," and a treatise: "De l'Éducation des Filles," both printed in 1688, "Maximis des Saints sur le Vie interieure" 1697; already noticed as the most frequent occasion of his dispute with Bossuet; "Dialogues of the Dead," two vols. 12mo.; "Discours of Eloquence in general, and on that of the Pulpit;" Dialogue of Rhetoric and Poetry, 12mo.; the latter being addressed to the French academy, of which he became a member in 1693; "Philosophical Works, or Demonstration of the Existence of God by natural proofs," 12mo.; "Letters on different Religious and Metaphysical Subjects," 12mo.; "Spiritual Works," four vols. 12mo.; "Sermons," 12mo.; several pieces in favour of the bull Unigenitus and the Formulary. "The most touching charm," says M. d'Alembert, of his works, is the sentiment of peace and repose with which he inspires his reader; he is a friend who joins himself to you, who feels his soul into yours, who tempers, and at least for a time, suspends your troubles and affections." In his theology he seems to give greater scope to feeling than to reason, which sufficiently appears from his connection with Madame de Guyon, and his predilection in favour of "Quietism;" but if he inclined to mysticism, and thus seemed to deviate from the established system of his church, he does not appear to have made the least approach to protestantism. On the contrary, no one has more forcibly incited the danger of putting the scriptures into the hands of the people, (a fundamental tenet of popery,) than Fenelon has done in his "Letter to the Arch bishop of Arras." Submission to the decisions of the holy see is likewise exemplified in his whole conduct as well as in his writings.

Indeed, Fenelon seems to have been one of those, who, either from early propensities, or from false reasonings upon human nature, or from an observation of the powerful in preceptions made by authority on the credulity, and a pompous ritual on the senses of the multitude, imagine, that Christianity, in its native form, is too pure and elevated for vulgar souls; and, therefore, countenance and maintain the absurdities of popery, from a notion of their utility.

Fenelon also wrote against the Jansenists; partly to please the court-jesuits, with views of conciliation, but principally, because their doctrine, which he termed "pitiless" and "overwhelming," was directly opposite to his own religious sentiments. "God," said he, "is to them only the "terrible" being; to me he is the "good" being; I cannot resolve to make him a tyrant who fill fetters us, and then commands us to walk, and punishes us if we do not." He was, however, though inimical to their opinions, indulgent to their persons, and never permitted them to be prosecuted; and when it was represented to him that the Jansenists were his sworn enemies; "that," said he, "is an additional reason for tolerating and pardoning them."

Of all Fenelon's writings his "Telemachus" was the most interesting and popular. It has been published in a great variety of forms, and translated into most modern languages. It is properly an epic poem in prose, and intended to be the instrument of a prince, to which purpose it is admirably adapted: for never were purer, more useful, and more elevated maxims of public and private conduct offered to the heir of a monarchy. Louis XIV. could not have more fervently detribuzed himself than by promoting such a picture of wise and humane government, and of the evils proceeding from unjust ambition and ostentations profusion. What were the author's views in composing this work appear in a memorial which he drew up after the death of Boffart, his principal enemy, in order to diffuade his friends from attempting to restore him to court: "God is my witnesses that I wrote the condemned book solely for the purpose of rejecting the errors and illusions of Quietism; and as to Telemachus, it is a fabulous narrative in the form of an heroic poem, like those of Homer and Virgil, in which I have introduced the principal actions that become a prince who is defined to govern. I composed this work at an epoch in which I was honoured with marks of the king's confidence and favour; and I must not only have been the most ungrateful of men, but the most disgraceful, had I ever desired to introduce into it farriical and offensive portraits. I abhor the very thought of such an intention. It is true that I interwove in those adventures all the truths which are necessary for government, and all the faults which may be committed by the sovereign power; but I stated none of them so as to form portraits and characters; and the more the work is read, the more it will appear that it was my plan to do justice to my subject, without painting any
any individual in particular. The narration was composed in haste, in small parts at a time, and on different occasions; it affords much room for correction; and the printed copy is moreover not conformable to the original. Yet I have preferred the letting it remain imperfect and disfigured to printing it exactly as I wrote it. I thought only of amusing the duke of Burgundy, and of instructing him while I amused him, without ever obstructing the work before the public; and all the world is aware that its appearance was occasioned by the infidelity of one of my domestics. All the king’s best servants know what my principles of honour and religion are, with respect to the sovereign, the state, and the country, and what a lively and grateful recollection I retain of his majesty’s favours.” Telenachus, as a work of invention, says Dr. Aikin, has great merit, and is read with pleasure for the beauties of its style, and the elegance of its fictions, by those who are little interested in its political lessons. Morevi. Mem. du Duc de St. Simon. Eliges Academ. par d’Alembert. Histoire de Fendel, &c. par M. L. F. de Bauffet, late bishop of Alais, &c. 3 vols. 8vo. Paris, 1808. Mohrlem’s Ecc. Hist. vol. 5. Gen. Biog. Monthly Review, vols. 57, 58, 59.

FENESTRA, a small island in the gulf of Venice, near the coast of Iliria. N. lat. 44° 54’. E. long. 14° 8’.

FENESTRANGE, in Geography, a town of France, in the department of the Meurthe, and chief place of a canton in the district of Sarrebourg, seated on the Sartre, formerly the capital of a lordship of the same name, which being vested in the duchy of Lorraine, was ceded to France; 33 miles E.N.E. of Nancy. The place contains 15,555, and the canton 9923 inhabitants, on a territory of 2173 square kilometres, and in 21 communes.

FENELON, in our Ancient Writers, is used for a tax or imposition raised for repelling of enemies. It comes from the Saxon feinds, an enemy, and geld, money.

FENG-BOA, a town of Afi, in the kingdom of Corea; 25 miles W.S.W. of Pih-bau.

FENIT, in Geography, a small island on the western coast of Ireland, in the bay of Tralee, county of Kerry.

FENKI, a town of the kingdom of Corea; 36 miles N.N.W. of Long-konang.

FENELON, in Botany. See Anethum.

Fenel, in Gardening, the common name of a well known plant of the tall growing culinary kind. See Anethum.

There are three sorts of this plant, Common Fenel, Sweet-Fenel, and Finocchio.

Common fenel has a strong fleshy root that penetrates to a great depth in the soil, and which continues for several years. It is capable of being raised in most soils and situations.

Sweet fenel does not rise so high in the stem as the common sort, and the leaves are more long and slender, and do not terminate in so many points. The seeds have greater length, and are more light in their colour. They are usually brought from Germany and Italy.

Finocchio has been long in cultivation in Italy as a favaled herb, but is rather strong to the palate. It is said to have been brought from the Azorian islands. See Anethum and Finocchio.

Fenel, in the Materia Medica. See Anethum semeiicum.

FENEL, flower, or, Devil in a Bush. See Nicella.

Fennel-flower of Crot. See Garidella.

Fennel-giant. See Fenula.

Fennel, Hog’s. See Peucedanum.

Fennel, Sweating. See Thapsia.

Fennel, Sea. See Critthum.

FENNY RIVER, in Geography, a branch of the Ganges, which discharges itself into the bay of Bengal. N. lat. 22° 49’. E. long. 91° 33’.

Another branch of the Ganges, which runs into the same bay, is called "Little Fenny river." N. lat. 22° 51’. E. long. 91° 29’.

FENNY-Stratford, a small decayed market-town in the hundred of Newport, and county of Buckingham, England, is situated on the road to Liverpool, (the ancient Watling street,) and is partly in the parish of Bletchley, and partly in that of Simpson. The town consists of one principal street on a rising ground, with a stone bridge over the river Loof. The church, which is in Bletchley parish, having been dilapidated ever since the reign of queen Elizabeth, was rebuilt in 1724 by subscriptions, procured by the exertions of Browne Willis. Fenny-Stratford is 46 miles from London, and contained, according to the late return to parliament, 84 houses, and 460 inhabitants. It had from time immemorial a market on Mondays, which was confirmed by charter in 1629; being discontinued during the civil war, it was revived after the Restoration. In 1665, this town was much depopulated by the plague, of which 139 persons died; the fines were fixed up, and the road was for a time turned into another direction; this calamity also proved fatal to the market, which has never flourished, and has for many years fallen into disuse. Four fairs are annually held; a grant for one was procured in the year 1629, two others were established by the charter of 1669.

An act of parliament was passed in 1790 for enclosing the hamlet of Fenny-Stratford. Lyfons’s Magna Britannia, vol. i. 440.

FENTE, a town of Egypt; 15 miles N. of AbüGirg.

FENTON, Edward, in Biography, who flourished in the reign of Elizabeth, was descended from an ancient family in Nottinghamshire, where he had some property, which he sold, as did also his brother Geoffrey, being, it is said, more inclined to trull to their abilities, than the fender patrimony descended to them from their ancestors; and they were, says an accurate observer of mankind, among the very few of those who take much during revolutions in their youth, without living to repent of them in their old age.

The inclination of Edward led him to the choice of a military and active life, and he served some time with reputation in Ireland, but upon Marti leishbiller’s report of the probability of discovering a north-west passage into the South seas, he resolved to embark with him in his second voyage, and was accordingly appointed captain of the Gabriel, a bark of twenty-five tons, in which he accompanied Sir Martin in the summer of the year 1577, to the islands that now bear his name, but in their return he was separated from him in a storm, and arrived safely at Bristol. In a third expedition, which proved unsuccessful, he commanded the Judith, one of fifteen sail, and had the title of rear-admiral: the miscarriage of this voyage had not convinced Fenton of the impracticability of the project; he solicited another trial, and it was, after much application, granted him, though the particular object of this voyage was not easily discovered; his instructions from the privy-council, which are still preserved, say, that he should endeavour the discovery of a north-west passage, and yet he is told to go by the Cape of Good Hope to the East Indies, thence
Fenton, Sir Geoffrey, brother to the above, being inclined to books rather than to the business of a military life, became a learned and elegant writer, and an active, able statesman, privy councilor, and secretary of state in the kingdom of Ireland. We find him a privy councilor in the year 1581; under the patronage of Arthur Lord Grey, then lord-deputy in that kingdom. He not a little strengthened his interest at court by his marriage with Alice, daughter of Dr. Robert Weldon, the lord chancellor of Ireland; and it is probable that he required only an opportunity to display his talents to make his own way. When once he was fixed in his office of secretary, he rendered himself so useful to the governor, that none of the changes to which that government was subject caused any alteration in his situation; and he never failed to use his power and influence for the interests of his country. He took every opportunity of persuading the queen that the Irish were to be governed only by the rules of strict justice, and that the safety and glory of her government in that island depended on her subjects enjoying equal laws and protection of their property. The queen frequently sent for her secretary, Fenton, to consult with him on her Irish affairs, which were sometimes in a most difficult and alarming situation; this shews the high opinion she entertained of his understanding, though it often happened that when he was returned to his duty, the advisers of Elizabeth persuaded her to adopt measures the reverse of what Fenton had recommended. He was the means of extinguishing more than one rebellion, and of totally reducing the kingdom to submit to English government. In 1603 Sir Geoffrey married his only daughter to Mr. Boyle, afterwards Earl Cork, which proved to all parties a source of great satisfaction. At this period, viz. the accession of James I. to the throne, the zeal and high services of Sir Geoffrey Fenton procured him the entire confidence of Sir Arthur Chichele, the new lord deputy. He continued to hold his office in full possession of his credit and authority till October 1608, when he died at his home in Dublin, and was interred with every mark of respect in the cathedral church of St. Patrick, leaving behind him the character of a polite writer, an accomplished courtier, a good statesman, and true friend to his country. He was perfectly acquainted with the French, Spanish, and Italian languages, and his translations from them are supposed to have first brought him into the notice of persons of rank and consideration at court; the translations mentioned in the Biographia Britannica are, 1. An Epistle to the Patrons of the Flemish Church in Antwerp, written by Anthony de Carro, 1578; 2. An Account of a Dispute at Paris between two Doctors of the Sorbonne, and two Ministers of God's word, 1571; 3. Golden Epistles, from the Latin, French, and Italian, 1577; and, 4. The History of the Wars of Italy, by F. Guicciardini, in twenty books, 1599. Biog. Brit.

Fenton, Elisha, was born at Newcastle, in Staffordshire, about the close of the 17th century. His father was a gentleman of considerable property; but Elisha being the youngest of twelve children, was destined to a profession, and was accordingly entered at Jesus College, Cambridge. His speculations respecting the terms of conformity precluded him from all expectations of academical honours and ecclesiastical preferment. He left the university with no other prospects than those which his literary talents could afford. At first he engaged in the humble employment of usher to a school in Surrey, and was afterwards master of the foundation school at Seven-Oaks, a school which at this time was in considerable repute, though probably diverted from the intentions of the founder. In 1710 he engaged as secretary to Charles, Earl of Orrery, at Brussels, and tutor to his son. He had already given specimens of his talents in poetry, and when his engagement with Lord Orrery had ceased, he obtained, through the recommendation of Pope, a situation with secretary Craggs, who, aware of the deprivations of his own education, wished for a companion, a man of taste and learning, from whom he might acquire occasional instruction. He next undertook, for Pope, the translation of the first, fourth, sixteenth, and twentieth books of the Odyssey, for which he received the sum of 200 guineas. His tragedy of Mariamne rendered him more known; it was performed in 1723, with very great applause, and produced him 1000l. with which he was enabled to discharge a debt incurred during his attendance at court; in an instructive manner," says his biographer, "between the patronage of the public, and that of a king or minister." Thus freed from an embarrassment, that probably hung heavy on his mind, we hear but little more of him as a writer. His exertions in this respect appear to have been more the product of necessity, than the spontaneous effusions of a mind delighted with the employment. He now undertook the domestic education of the son of lady Trumball, widow of Sir William Trumball; afterwards he went with him to Cambridge, and then resided with the lady herself as auditor of her accounts. Thus early in his situation, he had recourse to the press only for amusement. To an edition of Milton's poems he prefixed a life, written with candour and elegance. He then published a splendid edition of Waller, with notes; this was in the year 1729, and in the following year he died at Easthampstead, in Berkshire. His early death was brought on by want of exertion and indulgence. His pupil, Lord Orrery, says of him, "Poor Fenton died of a great
chair and two bottles of port a-day;" but he adds in at-
testation of his character, "He was one of the worthi-
and modest men that ever belonged to the court of
Apollo. Tears arose when I think of him, though he has
been dead above twenty years." Fenton's poetry is little
read now, but his "Ode to Lord Gower" was pronounced
by Pope to be exceeded by none in the English language,
e.xcept Dryden's on St. Cecilia's day. His tragedy of
Marianne, founded on the story of Herod, as related by
Josephus, maintains a respectable rank among dramatic
compositions, though it is never acted. Johnson's Lives of the
Poets.

FENUGREEK, in Botany. See Trigonella.

FENUGREEK, in the Materia Medica. The seeds, which
are brought to us from the northern parts of France and
Germany, have a strong disagreeable smell, and an acrid
farinaceous taste, accompanied with a slight bitterness.
An ounce renders a pint of water thick and yellow. To
rectified spirit they give out the whole of their distin-
guishing smell and taste, and afterwards to water a strong
flavourless liquor. These seeds are never given inter-
ially; their principal use being in cataplasms and fomenta-
ions, for soothing, maturating, and diffusing tum-
ours; and in emollient gouters. They were also an
ingredient in the "oleum mucilaginis" of the flaps; but
this has no longer a place in the pharmacopoeia. Lewis.

FEN, in Geography, a town of China, of the third
rank, 15 leagues from the sea, 100 miles E. of Yuen-tchen.

FÉO, or FEUDUM, in Geography, a town of China, of the third
rank, 15 leagues from the sea, 100 miles E. of Yuen-tchen.

FÉODAIRE, FEUDARY, or FEUDATORY, an officer an-
ciently made and authorized by the matter of the courts of

His office was to be present with the escheator, at
the finding of any office, and to give evidence for the
king, concerning the tenure, and the value thereof: to
survey the land of the ward after the office found, and rate
it. He also assigned the king's widows their dowers, and
received the rents of ward's lands. This office is taken

FÉODATARY, or FEUDATORY. See FÉODARY.

FÉODER, a measure for liquids, used throughout Ger-
many. See Measure.

FÉODITAS, in Old Writers, is sometimes used for
féodités, or féodary, which fee.

FÉODUM, or FEUDE, the name with féz, or fee.

FÉOFEEMENT, derived from the verb féofer, or in-
fradare, to endow, to give one a feud, in Common Law, is
the most ancient method of conveyance, and signifies a gift
or grant of honours, titles, manors, meffuages, lands, or
the likeness or immovable things, to another in fee-
simple; that is, to him and his heirs for ever, by the delivery
of feines, and the poñession of the thing given. See Fee,
and Livery.

When this is done by writing, it is called the deed of
feoference.

In every feoffment the giver is called the feofor, or feof-
itor, and he that receives, the feoffee.

The proper difference in our law between a feofor, and a
donor, is, that the feofor gives in fee-simple; and the donor
in fee-tail. Litt. I. c. 4.

This conveyance is now but very little used, except
where no consideration passes, as in case of trallaces of
lands for a corporation, etc. It is still, however, a formal, valid,
and effectual mode of conveyance; but of late years it has
been almost entirely superseded by the conveyance by lease
and release, which fee.

FEORME. See Farm.

FEOU-CHAN, in Geography, a town of China, of the
third rank, in Ch'ang-fu; 20 miles E.S.E. of Pin-yang.

FÉR de Fourchettes, crails a fer de fourchettes, in Heraldry,
is a crozant, having a forked iron at each end, like that for-
merly used by soldiers to rest their muskets on; by which it
is distinguished from the crozant fourche; the ends whereof
turn forked; whereas in this the fork is fixed on the square
cross.

FÉR de Moulin, q. d. iron of the mill, is a bearing in her-
aldry; supposed to represent the iron iron, or iron of a mill,
which furnishes the moving mill-stone.

FÉRABOSCO, ALFONSO, the Younger, in Biography, is
said to have been born at Greenwich of Italian parents.
He seems to have acquired considerable weight in this coun-
try, more from his name and the reputation of his father
than real merit. However convinced he may have been
himself of his superior abilities, we have no doubt con-
cerning the genius, at least, of this author, though he had
the poets and dilettanti all on his side; as his compo-
ositions that have come under our inspection seem wholly
unworthy of a great professor. The "Ayres," which
he published in London, 1609, with an accompaniment for
the lute, contain as little merit of any kind as we have ever
seen in productions to which the name of a master of esta-
blished reputation is prefixed: thee he dedicated, with
no great humility, to prince Henry, the eldest son of
James I.

Three herald miniature, yeilded Ben Jomond, T. Cam-
pion, and N. Tomkins, proclaimed the high worth and qua-
lities of these Ayres in three encomiastic copies of verses,
prefixed to the work; but these friendly hands, who prate
not with a very sparing hand, seem to have left extant ideas
of the author's merit and importance than himself; "Fer,"
says he to the prince, "I could now, with that solemn in-
dustry of many in epicles, enforce all that hath been said in
praise of the faculty of musicke, and make that commend
the worke; but I desire more, the worke should commend
the faculty: and therefore suffer theee few Ayres to owe
their grace rather to your highness's judgment, than any other
tellinonies. I am not made of much speech; only I know
them worthy of my name; and therein, I took paines to
make them worthy of yours.

Your highness's most humble servant,
Alfonso Ferabosco.

Four of these Ayres are inserted in Barne's General His-
tory of Musicke, vol. iii. The lute accompaniment to which
is mere thorough base, which the chords implied by the
figures placed over the base by the editor wholly compre-
 hend.

FERÉ, in Zoology, the third order in the Mammalia
clad of animals, or those which fuckle their young by
means of lactiferous teats: the order is distinguished by
having fix sharpish fore-teeth in the upper jaw, and palate
solitary. The genera comprehended in this order are Pheoc,
Canis,
Forc, or Furla, in Geography, a town of Pefia,

\[\text{Canon, Félix, Villarce, Messina, Uffo, Didelph, Talpa, Soro,}\]

\[\text{and Erinaceus, which see respectively.}\]

Ferc Nature, in our Law, signify birds or beasts that are wild, in opposition to such as are tame; such are hares, foxes, wild geese, or the like, wherein no man may claim a property, unless under particular circumstances, as where they are confined, or made tame, &c. See Game, and Property.

Ferara, or Ferrara, in Geography, a town of Pefia, in Segellan; 90 miles N.N.E. of Zagar. N. lat. 33° 0'. E. long. 42° 22'. Also, a river of Peru, which runs into lake Zoro, at Neusenden, in Segellan.

Ferara, a town of Peru, in the province of Irak; 72 miles E.E. of Neubehn.

Feralia, in Antiquity, a feast held by the Romans, on the 21st of February, in honour of the dead, or of the Dii Manes. Vide Mem. Acad. Inscript. tom. i. p. 4.

Varro derives the word from inferi, or from inferus; on account of a repast carried to the sepulchres of the dead to whom the last offices were rendered on that day. Pausanias derives it from ferus, on account of the victims sacrificed. Volusius observes that the Romans called death ferus, crusul, and that the word was a might arise thence.

Macrobius, Satir. lib. i. cap. 14, refers the origin of the ceremony to Numa Pompilius. Ovid, in his Fasti, goes back as far as Romas for its initiation. He adds, that on the 21st of February a sacrifice was performed to the goddess Mata, or Dumb; and that the persons who officiated were an old woman, and a number of young girls who attended her. This feast sometimes continued for several days; and at its termination friends and relations kept a feast of peace and love, for settling differences and quarrels among one another, if any such existed.

Feran, in Geography, an island in the North Pacific ocean, near the S.W. coast of Quadra and Vancouver's island, about 16 miles in circumference. E. long. 234° 17'.

Feranza, a town of Naples, in the Basilicata; 4 miles N.W. of Acerenza.

Ferasht, or Firestack. a town of Egypt; 14 miles S.S.E. of Faoué.

Ferbanos, a town of Africa, in the kingdom of Bambool, 40 miles N.W. of Bambool. N. lat. 13° 45' E. long. 29° 58'.

Feranti, or Fersadi, a town of Africa, in the country of Dornelmas, on the E. bank of the river Falche, 65 miles S.W. of Bambool. N. lat. 12° 40'. W. long. 12° 8'.

Ferbar, or Ferber, a town of Great Bucharia, on the Gihon, opposite to Amm.

Fercula, or Fercula, a town of Africa, and principal place of a district, in the country of Taftik; 50 miles W. of Sugulmaia. N. lat. 51° 40'. W. long. 4° 56'.

Ferd-Wit, or Ferdi-Wiele, in our Ancient Chronicles, a formulium, by which the king pardoned manslaughter committed in the army.

The word is formed of the Saxon ferde, army, and siete, punishment.

Ferdifare, from the Saxon ferde, army, and siete, journey, in our Old Writings, is used for being discharged from going to war.

Ferdinand I., in Biography, emperor of Germany, second son of Philip, archduke of Austria, by Joanna of Calab, was born in Spain in 1503, and being educated in his native country became a greater favorite with the Spaniards than his elder brother Charles V. He was encouraged to expect the regency of Arragon from his grand-father Ferdinand the king, who was persuaded to alter his last will in favour of another. The young prince showed symptoms of discontent at the change; and, being brought to Madrid, he was kept under the vigilant eye of cardinal Ximenes. Some time afterwards, he was sent to Germany to visit his grand-father Maximilian. Here he married Anne, daughter of Ludolph, king of Hungary and Bohemia, and Charles immediately settled on him both Austria, and all the domains appertaining to that House in Germany. When his brother-in-law, Louis, was slain at the battle of Moharz, in 1528, Ferdinand laid claim to, and obtained, the crown of Hungary and Bohemia. Through the influence of his brother, then emperor, he was elected king of the Romans in 1531, notwithstanding the opposition of the Protestant elector of Saxony and Brandenburg. Hungary, in the mean time, was invaded by the Turks, with a host of Serbs at their head, who eventually gained possession of a great part of the country. Ferdinand thought it advisable to treat, and to allow the count all he had acquired, with the title of king of Hungary, during his life, but at his demise it was to revert to himself. At his death, however, a great part of the nation recognized his son by the name of king Stephen. Ferdinand now attempted to enforce by arms the performance of the treaty, but Solymán, the Turkish emperor, joined the Hungarians, defeated the forces of Ferdinand, and seized a great part of Hungary for himself. After this, Ferdinand submitted to pay him a tribute for the portion he still held. His attempts to extend his possessions in Bohemia, and render its crown hereditary, together with the progress of the reformation in that country, having occasioned an armed confederacy against the royal authority; Ferdinand, at the head of a body of imperial troops, dispersed it, and disarming the people, reduced them to greater subjection than before. He treated the city of Prague with great rigour, and abolished its ancient privileges. In 1551 he invaded Transylvania, and obtained possession of it by the renunciation of queen Isabella, mother of Stephen; this province was, however, soon wrested out of his hands by Solymán, who recovered it for his child in 1553. Charles, as we have seen, obtained for Ferdinand the title of king of the Romans, but now, on account of his boundless ambition, he was desirous of transmitting the imperial crown to his own son Philip. Afterwards, indeed, he committed the management of his German affairs almost entirely to Ferdinand, who opened the diet of the empire at Augsburg in 1555. In this toleration was granted and confirmed to Protestants, and the church was for some time established. Charles again attempted to persuade his ambitious brother to renounce the succession in favour of Philip, but his intrigues were of no avail: he therefore, in 1556, executed a deed of renunciation of the empire, and at the diet of Frankfort, in February 1556, Ferdinand was unanimously declared emperor. The 1545, Paul IV., resided to acknowledge the renunciation of Charles, and succession of Ferdinand, because the content of the holy see had not been previously obtained. His face for this IV. did, however, recognize the new emperor. In his character of emperor, Ferdinand attempted to reconcile the Protestants to the Catholic church; his endeavours were unavailing, but he was successful in securing the succession to his son Maximilian. It is highly to his credit that he preferred the public peace of the empire, made a truce with the Turks of eight years, and terminated a dispute between the kings of Denmark and Sweden. He died at Vienna in 1562, leaving behind him four sons and eighteen daughters. Ferdinand was undoubtedly ambitious, but he was justly famed for his remarkable equity, prudence, magnificence, and unwearied application to business. He however piqued himself on a rigid Na
obedience of his word and gave a striking instance of his punctuality in that respect, by bel owmg a favour on an officer, who, after the promise, had proved himself unworthy of it. "I owe," said the monarch, "a greater respect to my word, than to the merits of him to whom I pledged it." — Robertson, Ch. V. — Univcrs. Hill.

Ferdinand II, emperor, grand-son of the preceding, son of Charles, archduke of Styria, by Mary of Bavaria, was born in 1578, and elected king of Bohemia in 1617, and king of Hungary in the following year; but the religious disputes in Bohemia having caused a revolt, Ferdinand was deprived of the kingdom soon after the death of his cousin, Matthias, by whose influence he had been originally chosen. He was, however, at the same time, appointed to the succession of the empire, and in the character of emperor he found it necessary to form a Catholic league, in order to oppose that of the Protestants who supported the elector Palatine. That unfortunate prince was completely defeated at the battle of Parnawa in 1625, in consequence of which Bohemia was obliged to submit to its former master. The leaders were put to death, and the exercise of the Protestant religion was entirely suppressed. Ferdinand carried his resolution to such a length that he put his son to the ban of the empire, and to invade the Palatinate, which, by means of his general, count Tilly, he entirely conquered, and then transferred the electoral dignity to Maximilian, duke of Bavaria. He was now become so formidable to the Protestant party, that a league was formed against him in the north of Germany, headed by Christian IV. king of Denmark. Ferdinand, however, triumphed over all his enemies, and then turned his attention to the affairs of Italy, where the death of Vincent, duke of Mantua and Monteferrat, had left a disputed succession. The Austrian troops invaded and took Mantua, while their allies, the Spaniards, took Cazal, which was defended by the French. In the confidence which these successes inspired, the emperor took the most hostile measures against the Protestants; these in their turn applied to Gustavus Adolphus, king of Sweden, who was not only brave, but the professed enemy of the house of Austria. A league was formed, to which the king of France acceded, and almost before the emperor was apprised of his danger, a war broke out, which reduced the house of Austria to the greatest extremities, but he was enabled to make peace in 1635 with the elector of Saxony and most of the Protestants. In the following year, at the diet held at Ratisbon, the emperor procured his son Ferdinand to be elected king of the Romans, and in February 1637 he died in the fifty-ninth year of his age, after an anxious and unquiet reign of eighteen years. By the performance of several vows which he made against the Protestants, he acquired the appellation of the Apostolic Emperor. He is much applauded by Roman Catholic writers, but his conduct as emperor has little claim to praise. — Med. Univer. Hill.

Ferdinand III, emperor, son of the preceding, was born in 1609, and succeeded to the empire on the death of his father; he happily tranquilized the interior of Germany, but had the mortification to perceive that the flames of war continued to rage with unabated fury on the frontiers, and that the calamities of the people were prolonged by the abilities of the generals employed. These distinguished themselves by their gallant conduct, and the hostile sovereigns, depending on unfailing resources in their commanders, were but little alarmed by occasional defeats. Hooliines were consequently carried on with vigour, and the ill-fated inhabitants of Germany still groaned beneath the yoke of oppression. Various attempts were made to negotiate, and at length, in 1648, the peace of Munster was concluded, which has served since as the political basis of the Germanic confederation. By this treaty the king of Sweden acquired a large part of Pomerania, with the dignity of prince of the empire; the king of France became landgrave of Alzace, and the Lutherans and Calvinists, who were placed upon an equal footing with the Roman Catholic. A variety of other conditions were agreed on relative to the states and princes of Germany, which were received into the fundamental law of the empire. The pope opposed that part of the treaty which allowed the religious claims of the heretics, but his remonstrances were disregarded. The emperor procured the election of his eldest son to the dignity of king of the Romans, in 1652, but that prince's death not long after left the succession undetermined. Ferdinand himself died at Vienna, in 1657, at the age of 49. He was reckoned a mild, humane, and generous prince, attached to religion, a friend to literature, and liberal to those who served him. — Mod. Univer. Hill.

Ferdinand I, king of Castile and Leon, the first in whom those crowns were united, was son of Sanchez III, king of Navarre, and of Nunga, heiress of Castile. He was crowned king of Castile, in right of his mother, while his father was living, at the age of 15. He married Infanta of Alphonso V. king of Leon, whose brother Bermuda, when come to the throne, engaged in war with Ferdinand, and invaded Castile. Bermuda was slain in a battle in 1657, and Ferdinand was acknowledged king of Leon in right of his wife. He was now the most powerful monarch in Spain, but he conducted himself with so much moderation towards his various subjects, that he obtained their unanimous attachment. He made war on the neighbouring Moors, and pushed his conquests into Portugal, as far as Coimbra, of which he became master in 1545; making at the same time the kings of Toledo and Saragossa his tributaries. Garcia, his brother, was king of Navarre, and being at this time extremely ill, Ferdinand paid him a visit, but finding that a plan was laid to seize his person, he retired in disgust. The next year Garcia visited him on a like occasion, and was actually detained prisoner; he found means, however, to evade the vigilance of his keepers, and a war ensued between the brothers, in which Ferdinand acted on the defensive. Garcia was killed, and Ferdinand is said to have caused his murder. Ferdinand's moderation was but a delusion, he having abjured from injuring his nephew, the young king of Navarre. But the queen, desirous of enriching a new church at Leon with the bodies of two virgin martyrs, interred at Seville, caused Ferdinand, without provocation, to make an incursion into the Moorish territory, the inhabitants of which he compelled to do him homage, and to comply with his religious requisition. In the mean time his son Don Sanchez, acting as an ally to the king of Saragossa, defeated Ramiro, king of Arragon, in a great battle. Rodrigo, better known by the name of Cid, commanded under Sanchez on this occasion. After this, in an assembly of the states, he declared his intention of dividing his kingdoms among his three sons. The consequence of this imprudent policy was a revolt of the Moorish dependent kings of Toledo and Saragossa, who refused tribute, and attempted to shake off the yoke. Ferdinand marched against them with a powerful army, but a sudden indisposition obliged him to return to Leon, where he died in the autumn of 1655, leaving a high character for civil and military talents, and for an unblamed private life. — Mod. Univer. Hill.

Ferdinand I, king of Castile and Leon, son of Alphonso IX, king of Leon, and Berengara, infant of Castile, was born in 1200. On the death of the king of Castile,
Ferdinand.

In 1475, the right to the crown was recognized by the states to belong to Berengaria, his sister, who resigned it to her infant son Ferdinand, when she consented to be incarcerated in the cathedral, amidst the acclamations of the people, but his father, the king of Leon, marched suddenly an army into Castile, with a view of seizing the regency; he was, however, obliged to retreat. In 1479, the young king Ferdinand was married to Beatrice of Savoy, daughter of the emperor Philip, after which he was engaged for several years in war with the Moorish princes, his neighbours, from whom he took a number of fortresses. In 1472, the king of Leon died, and by his last will divided his dominions between his daughters, which had mostly produced a civil war; for while a part of the states adhered to the infanta's cause, the red, who were the majority, declared in favour of Ferdinand. At length the ladies, in consideration of an ample pension, resigned their rights to their brother Ferdinand, who thus accomplished the re-union of the kingdoms of Castile and Leon, which have never since been separated. Ferdinand concluded a treaty with the king of Portugal, and continued to pursue his plan of reducing the Moors. After a series of enterprises, most of which were crowned with successes, as well by land as by sea, he took Seville in 1488, and in the following year gained possession of all the remaining Moorish towns and fortresses as far as the sea. He next projected the invasion of Africa, but a drop of put an end to his design, and, in 1482, terminated his life. He had shown great regard, during his life, to what was then called religion, and he died with all the demonstrations of profound piety and humility, which are inculcated by the Catholic religion, and was, by his subjects, immediately regarded as a saint, though he was not canonized at Rome, and admitted to their calendar till 1671, during the reign of Clement XI. He left a large family, and was succeeded by Alphonso X. Ferdinand V. was married, in 1494, to the Catholic, fan of John II. king of Aragon, was born in 1452, and married, in 1469, Isabella of Castile, sister of Henry IV. At the decline of 1474, he was declared king, and Isabella queen of Castile and Leon. The new sovereigns were proclaimed amidst loud acclamations, and the fidelity of their flight, etc. enabled them to subdue all the defects of their enemies, and to obtain quiet possession of the crown, though not till the event of a civil war had decided in their favour. Ferdinand's father dying in 1479, he succeeded to the crown of Aragon, and thenceforth the kings of Aragon, and of Castile and Leon, which comprehended all Spain, except Granada, held by the Moors, became inseparably connected and united. Ferdinand and Isabella governed with great prudence, but rather on independent sovereigns than as man and wife; they were not unfrequently jealous of each other in their administration, though they generally acted upon the same principles, and forwarded the same purposes. While they took great pains in giving vigour to their government, and tranquility to their people, an intemperate zeal led them to introduce that infernal engine of torture, the court of inquisition, into their dominions. It was said, indeed, that it was only intended to take cognizance of the frequent apocryphals among Jewish and Mahometan pretended converts, and therefore regarded as a measure equally conformable to the interests of policy and religion. This, however, was but a侧重 trick, for it was soon discovered that it was a court authorized by the pope to decide upon the liberty, fortune, and life of any individual who should be accused of holding heretical opinions, or of expressing any contempt for the ceremonies of the church, without being allowed to offer a defence, or even to be confronted with his accuser. Two thousand persons are said to have suffered death under the savage Torquemada, the first inquisitor general, and a multitude of Jews and Mahometans quit the country with precipitation to elude a similar fate. To this horrible engine of torture may be imputed all the degradation to which Spain has submitted since that period. The foreign nations who introduced the inquisition little contemplated the miseries they were bringing on their own countrymen; they would have smothered the idea; they were in their nation's moderate and humane, and at all times caused civil justice to be administered with equal severity without regard to rank or condition. In 1481 they attacked the Moors, and after a war of ten years reduced their kingdom of Granada, and thus the whole of Spain was said to be completely Christian, without perhaps a single individual understanding what was implied by the epithet. Isabella next, for Ferdinand was now become a very secondary sovereign, in the favour of religious zeal, attacked and expelled the Jews from her dominions. Fortunately for these miserable outcasts of society, they have always been ready to follow a Christian master, when persecuted in one city, or state, to flee to another. When Isabella had swept from her dominions all heretics, the whole population had the latter part of the project more honourable to her memory; she took a chief concern in fitting out Columbus for the grand expedition, which bellowed a new world on Spain, to little meeting the high honour. (See America, Columbus, &c.) Another act of this
regain must not be overlooked: the conquered Moors were at first tolerated in their religion, but it was now determined that, by force, or persuasion, or pious fraud, they must be converted; a short time, in which much blood was shed, proved the absurdity and impracticability of the plan, and Ferdinand compromised the matter by allowing his unhappy people to retire to Barbary, a measure which tended to preserve the peace of the country, but which was injurious in a high degree to its industry and population. The decline of agriculture and manufactures in Spain is dated from this period.

In 1502 the archduke Philip, with his wife Joanna, at the desire of Isabella, visited Spain, and were acknowledged by the emperor as Caetili as successors to the crowns of Castile and Aragon. Upon intelligence of a rupture between the emperor and the court of France, the archduke resolved upon returning into his own dominions, notwithstanding the remonstrance of the king, and the entreaties of his wife. He left Madrid on the 19th of December, and gave a fresh caufe of offence to his father-in-law, by concluding a treaty with the king of France. In March Donna Joanna was delivered of a son, who was baptized by the name of Ferdinand, but the consequences of her delivery deranged her mind, a circumstance that sunk so heavily in the mind of Isabella, as shortly to bring her to the grave. This event took place in 1504; and though by her will she appointed Ferdinand to the regency of Castile during the minority of their grandson Charles, afterwards the emperor, yet Philip took measures to oblige him to resign in favour. He enjoyed his power but a short time, dying in Sept. 1506; and his wife being utterly unable to perform the duties of government, the regency was therefore again an object of content, and the competitors were the emperor Maximilian and Ferdinand. About the close of 1511 Ferdinand sent the duke of Alva, with a small army, to demand a pilgrimage through the king of Navarre’s territories into France, and, on the rejection of his request, made himself master of Pamplona, and the greatest part of the kingdom; this was supposed to add great laurels to the Spanish crown, and to augment the fame of Ferdinand’s admirable policy. He now fell into a languishing habit of body, and a deep melancholy seemed to settle on his mind, which admitted of no diversion, and baffled the skill of the most able physicians, but which nevertheless induced in a measure when busines required his attention. He was still as anxious as ever after power; unwilling even at the approach of death to admit a thought of relinquishing any portion of his authority; he removed from place to place, in order to fly from his disorder, or to forget it, but in vain;

The last words are from himself can fly

By chance of place.

He died January 23, 1516, being in the sixty-fourth year of his age. He left his daughter Joanna heiress of all his dominions, and afterwards they were to descend to the grandson Charles. Ferdinand had acquired a high reputation for policy and the arts of government, but he was regardless of any engagement; provided it interfered with a new design; he even made his vassals a bread or bafk of livelihood. Still, where religion was out of the question, he displayed towards his own族 its mildness and equity. He was beloved by the lower orders, whom he protected from the oppression of the nobility, and took means to break the power of the feudal nobility. Modern Univer. Hist.

Ferdinand, king of Portugal, was born in 1510, and succeeded his father in 1517. He was extremely handsome, very courtious, cheerful, and liberal; but his levity and fickleness produced the most dishonorable consequences to his government and people. He had relented, during his father’s lifetime, a proposed marriage to the daughter of Peter the Cruel, king of Castile; and at his accession sent to compliment Henry count of Trastamare, who had expelled Peter from the throne; yet on the death of Peter he assumed to himself the title of king of Castile, and entered into a war with Henry. Ferdinand, though he had made a league with the king of Aragon, and had actually married by proxy his daughter Leonora, was induced by the intercession of the pope to make peace with Henry, with the condition of marrying his daughter Leonora; but a third Leonora coming in his way, he was led to break his former engagements and marry her. This alliance caused a revolt at Lisbon, and proved the source of much mischief and dissatisfaction during his reign. He entered into an alliance with John of Gaunt, duke of Lancaster, who had a claim on the crown of Castile in right of his wife, and engaged in a new war with Henry. In this contest Portugal was over-run, and part of the city of Lisbon was taken and burnt, together with the first, and Ferdinand was reduced to make peace again. Mutilations between the English and Portuguese, and the naturalickness of Ferdinand, caused a hidden treaty to be concluded between the two crowns of Portugal and Castile, with a stipulation that the English troops, who had come out to the aid of Ferdinand, should be withdrawn. Soon after Ferdinand gave his only daughter Beatrice in marriage to the king of Castile, on condition that her children, or her husband, in case she died without issue, should succeed to the crown of Portugal. The nation would not, however, concur to this agreement; they took it in open intent, concerned, and spurned the proposal with indignation. Ferdinand was now in weak health, and had other causes of chagrin, besides public disappointment: he fickened, and bore a long and painful disease with much resignation, and died in the sixteenth year of his reign. Mod. Univer. Hist.

Ferdinand I. king of Naples, natural son of Alphonso V. king of Aragon, was rendered legitimate by the decree of pope Eugenius IV. and ascended the throne of
of Naples on the death of his father, in 1428, and was crowned in the following year. The country was soon involved in a civil war, by the interference of some discontented barons, who demanded John of Anjou as their king. John readily seconded their views, entered the kingdom, and gave Ferdinand a signal defeat, which caused him to be defeated by the greater part of his subjects. He, however, recovered himself, and defeated his adversary at Trois, and, by his subdual conduct, restored tranquillity to the kingdom. He employed the years of peace in those internal improvements which render a country great and respectable, in the encouragement of learning, arts, and manufactures, and in obtaining for the laws that degree of respect which commands obedience. He affi grated Pope Sixtus VI. in his designs against Florence, where he had projected the ruin of the family of the Medici. Lorenzo, however, with a magnanimity worthy of him, repaired in person to Naples, and threw himself into the power and under the protection of Ferdinand. This liberal and candid conduct prevailed on the king to conclude an alliance with the Florentines, without conflicting the pope. In 1480 the Turks feized on Otranto, but it was recovered by his son Alfonso. To this son, who was totally unfit for government, Ferdinand committed the care of the empire, which excited so much discontent, that pope Innocent VIII. found means to encourage a revolt which threatened the safety of the throne. Ferdinand, in his turn, excited disturbances against the pope in the ecclesiastical state, which brought about peace. Pardon to the barons was one of its conditions; but this part of the treaty was shamefully violated, and many were put to death for their share in the rebellion. Soon after, Charles VIII. king of France, prepared to invade Naples, and Ferdinand, conscious that he had no claim upon the affections and loyalty of his subjects, was much alarmed. He took measures of defense, but in the midst of his cares he was feized with a fit of apoplexy, of which he died in 1494, at the age of seventy-one, leaving his crown to his son Alphonso. The ruin of tyranny adheres to his name, but it is allowed that he professed, in several points, the true wisdom of a sovereign. He was author of many useful laws, was the reformer of the majority of Naples, to which he introduced several eminent scholars, and was the author of a volume of orations and epistles.

Ferdinand de Cordova, flourished in the fifteenth century, and has been celebrated in the most ancient ages for his great learning and almost universal genius. He understood all the oriental languages, as well as Greek and Latin. He was an adept in canon and civil law, in mathematics, medicine, and theology. He is said to have committed to memory the works of the most famous philosophers and poets, and those of Aristotle, Hippocrates, Galen, and Avicenna. To these mental acquirements he added a perfect knowledge of martial exercises, he played upon all musical instruments, and is said to have excelled in singing and dancing. He was at Paris in 1445, commanding the applause and admiration of that metropolis; and, in account of his wonderful powers he was regarded as a coruscus, or even as the antichrist. It is not known either when or where he died. Some works on theology and law have been attributed to him. Moretti.

Ferdinand de Jesus, a Spanish monk, was born in Andalufia, and embraced the monastic state at Granada in the year 1588. He was a great proficient in the different branches of sacred and profane literature, and was so eloquent, that he obtained the name of "Chirifollobo," or "Golden Mouth." He became a celebrated teacher of theology and morals in the different towns of Spain, and left behind him numerous writings, which are highly esteemed in that country, where his memory is still regarded as well for his piety as for his expository learning. Moretti.

Ferdinand Engel, a physician of Messina, in the territory of Otranto, where he was born October 22, 1590. He cultivated the study of the Latin and Greek poets at an early age, and wrote elegant verses in both these languages. In 1593 he went to Naples with the intention of going through the courses of philosophy and medicine, and remained there, with the exception of six months in the year 1595, when all strangers were compelled by the viceroy to leave the territory, until the year 1594, when he received the degree of doctor in medicine and philosophy. He then repaired to his native place, where he settled himself in the practice of his profession, and remained to the end of his life, notwithstanding several honourable offers of distinction from several seats of learning. The duke of Parma, in particular, pressed him to take the professorship of medicine in the university of his city; and the same invitation was given from the university of Padua. He died in 1638, in the sixty-ninth year of his age.

This physician composed a considerable number of treatises, but only the four following are known, as having been printed: "Thesaurus Medica et Philosophica," Venice, 1611. 1. "De vita Ferdinandi, feu juventude conferenda et incessu retardanda," Naples, 1612. 2. "Centum Historiae, seu Observationes et Caus Medicinae," Venice, 1621; a treatise which relates to most of the diseases of the body, and is distinguished by considerable erudition. It has been several times republished in Germany and Holland. 4. "Aureus de Pelle Libellus," Naples, 1631. Moretti.

Ferdusus, a celebrated Persian poet, flourished about the year 1020. He was originally only a simple peasant, but, having discovered a natural genius for poetry, he became a disciple of Afsafi, and soon so far surpassed his master as to obtain the admission of the East. His principal work was entitled "The History of the Kings," containing a narrative, in verse, of the acts of the ancient sovereigns of Persia. It is said to have contained sixty thousand difficulties, for each of which has obtained, of the reigning king, the reward of a piece of gold. It is now so much valued, that copies usually sell for more than one hundred crowns. Moretti.

Feke, L., in Picardy, a town of France, in the department of the Aisne, and chief place of a canton in the district of Laon; situated in a military forest on the river Sarre, which joins the Oise. The adjacent country is much inundated. It was very strongly fortified by cardinal Mazarine, but afterwards dismantled; 16 miles N.E. of Paris. The place contains 2,654, and the canton 13,884 inhabitants, on a territory of 107 kilometres, in 26 communes. N. lat. 49° 45'. E. long. 3° 26'.

Flechampsenefs, a town of France, in the department of the Aisne, and chief place of a canton in the district of Episy; 12 miles E.N.E. of Soissons. The place contains 1,882, and the canton 7,942 inhabitants, on a territory of 110 kilometres, in 21 communes.

Flere-Griselles, a town of France, in the department of the Aisne, and chief place of a canton in the district of Oise; 10 miles N.E. of this place. The town contains 1,884, and the canton 9,883 inhabitants, on a territory of 227 kilometres, in 24 communes.

Fleurb. Georgius, in Siciliana, a dilettante musician, who distinguished himself in our country at a numerous period for every species of secular music. This gentleman was master of arts of Magdalen college, Oxford, 1595; mit-
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FER, Francis Paul, in Biography, a landscape painter, born at Vienna 1659, where he studied under different masters. In 1718 he left Vienna, and went to Dresden and Bamberg in company with Alexander Thiele; in whose landscapes he inflected the figures and animals. He afterwards visited England, where, not meeting with the encouragement he had found there, he became involved in his circumstances, and, according to report, was found dead at the door of his lodging, exhausted by cold, want, and misery.

The style of Ferg was in imitation of Weemansenn, but has neither the violence nor truth of the latter; his painting is remarkably neat, and his figures pleasing, but his colour is generally faint, and often mealy; still, his genius will always please those who are gratified with pictures, and have taste to admire neatness and deliberacy in execution. His pictures are usually small. He enriched well in aquafortis, and his prints are eagerly sought for by the curious. He died in 1740 aged 51.

FERGA, St. in Geography, a town of Arabia, in the province of Hedjaz; 73 miles S.S.E. of Medina.

FERRAGA, a province of Great Bactaria, situated on the river Seir or Sihon. It is mountainous, and bounded in names of gold, silver, copper, iron, and coal. Andrag is the capital. N. lat. about 40° to 42°. E. long. 75 to 70°.

FERGUS, a river of the county of Clare, Ireland, which forms a large estuary full of islands at its junction with the Shannon. This river dips under ground in some part of its course. Limerick, the county town, is on this river, and is a small port at Clare, which is situated a few miles lower on it. This river is navigable from the Shannon up to Clare, near Ennis.

FERGUSON, James, in Biography, a practical philosopher and an astronomer of distinguished reputation, was born in a humble station at Keigh, a small village in Scotland, in the year 1710. At a very early age he gave evidence of extraordinary genius; for he learned to read by merely listening to the instructions which his father communicated to an elder brother, and by him he was also taught to write. He was afterwards sent for about three months to the grammar school at Keigh. His taste for mechanics appeared when he was only about 7 or 8 years of age, and by means of a turning lathe and a knife, he constructed machines that served to illustrate the properties and uses of the lever and of the wheel and axle. Of these machines, and the mode of their application, he made rough drawings with a pen, and wrote a brief description of them. At this time his knowledge was so imperfect, that he conceived himself to have made some original discovery. Unable to publish without some employment, he was placed with a neighbouring farmer, and occupied for some years in the care of his sheep. In this situation he commenced the study of astronomy, devoting a great part of the night to the contemplation of the stars, while he amused himself in the daytime with making models of spinning wheels, mills, and other machines which he had an opportunity of observing. By another farmer, in whose service he was engaged, he was much encouraged in his astronomical studies, and enabled, by the assistance that was afforded him in his necessary labours, to refine a part of the day for making fair copies of the observations which he roughly sketched out in the night. In making these observations he lay down on his back, with a blanket about him, and by means of a thread strung with small beads, and stretched at arm's length between his eye and the stars, he marked their positions and distances. This kind
Kindly refer to the previous neighbouring gentlemen, one of whom took him into his house, where he was instructed by his Butler in decimal arithmetic, algebra, and the elements of geometry. Deprived of the assistance of his preceptors, he returned to his father's house; and availing himself of the information derived from "Gordon's Geographical Grammar," he constructed a globe of wood, covered it with paper, and delineated upon it a map of the world; he also added the meridian ring and horizon, which he graduated; and by means of this instrument, which was the first he had ever seen, he could solve the problems in that treatise. His father's contracted circumstances obliged him again to seek employment; but the service into which he entered was to laborious as to affect his health, and injure his constitution. For his amelioration in this enfeebled state he made a wooden clock, and also a watch, after having once seen the inside of such a piece of mechanism. His ingenuity obtained for him new friends, and employment fitted to his taste, which was that of collecting clocks, and of drawing patterns for ladies' needle work; and he was thus enabled not only to supply his own wants, but to afford his father. Having improved in the art of drawing, he was induced to draw portraits from the life, with Indian ink, on vellum. This art, which he practised with facility, afforded him a comfortable subsistence for several years, and allowed him leisure for pursuing his favourite studies. From Scotland he removed to London in 1743; and being recommended to several scientific persons, he was treated with kindness and friendship; and encouraged to publish some curious astronomical tables and calculations, and to commence a course of lectures in experimental philosophy, which he repeated in various parts of the country. In the year 1754 he published "A Brief Description of the Solar System, to which is subjoined an Astronomical Account of the year of our Saviour's crucifixion," 8vo.; and also "An Idea of the Material Universe, deduced from a survey of the Solar System," 4to. In 1756 he published, in one volume, 4to., a larger work, entitled "Astronomy explained upon Sir Isaac Newton's principles, and made easy to those who have not studied Mathematics." 

About this time he was also introduced to the present majesty, then prince of Wales, and had the honour of delivering lectures to him, for which he received several presents; and after his accession to the throne Mr. Ferguson obtained a pension of 50l. a year. In 1760 he published his "Lectures on Subjects in Mechanics, Hydrostatics, &c. which is annexed to the second edition of that work. His "Young Gentleman and Lady's Astronomy, familiarly explained in ten Dialogues," was published in 1768, and re-printed in the following year, under the title of "An Early Introduction to Astronomy, for Young Gentlemen and Ladies." His "Introduction to Electricity," 8vo., appeared in 1770; and in 1773 "Select Mechanical Exercises, shewing how to construct different Clocks, Oreeries, and Sun-dials, on plain and easy Principles, &c." 8vo. with an account of his life prefixed, written by himself. In 1775 he published "Two Letters to the Rev. John Kennedy, containing an Account of many Males in the Astronomical part of his Scripture Chronology, and his abstruse treatment of Astronomical Authors," 8vo. which were followed by a "Third Letter" on the same subject. In that year appeared his last work, entitled "The Art of Drawing in Perspective, made easy to those who have no previous knowledge of the Mathematics," 8vo. Mr. Ferguson also communicated several papers to the Royal Society, which were printed in the Philosophical Transactions. He died, after long labouring under the infirmities of a feeble constitution, in the year 1776. From the above detail it must appear that he was a man of extraordinary genius, particularly in mechanical inventions and contrivances. He was distinguished also by an unacknowledged and peripatetic mode of communicating his ideas both in his lectures and his printed works. His knowledge of pure mathematics, however, was very limited and superficial; and our readers may be surpised when they are informed, upon the authority of Dr. Hutton, that he could never demonstrate one proposition in Euclid's elements. His judgment was clear, his application indefatigable; his disposition was humble, meek, and benevolent, and his manners were distinguished by a simplicity and courteousness, which engaged the esteem of all who knew him. The compiler of this article can testify, from personal knowledge, that he possessed these several qualities in an eminent degree. His whole life, as it has been justly said, exemplified resignation and Christian piety; and "philosophy seemed to produce in him only diffidence and urbanity, a love for mankind, and for his maker." "Account of his Life," &c. above referred to. Nichols's Anecdotes of Mr. Bowyer. Hutton's Math. Dict. Gen. Biog. 

FERHAD, in Geography, a town of Peria, in the province of Khorafan; 40 miles S.E. of Neffapour.

FERIA, a town of Spain, in the province of Extremadora, situated on a mountain near the Guadiana; eight miles N. of Badajos.

FERLE, among the Romans, were holy-days, or days wherein they abstained from work. The word feria is usually derived from the Lat. feriare, to keep holy, a holy day. Others observe, that all days in general, though they were not feast-days, were anciently called feriae, or, as Vossius reads it, festa; whence, according to that author, was formed the word feria. The feriae, or dies feriae, were observed and distinguished chiefly by rest; whereas the feasts, or dies fasti, before a cessation from labour, were celebrated with sacrifices and games; so that there were feriae, which were not feast-days; though authors frequently confound the feriae and fasti. Oth is confounded the feriae with the dies nefasti, or unfruitful days.

The Latin feriae amount to the sabbath of the H.brews. The Romans had divers kinds of feriae, public and private, fasted and occasional; their names, at least those of.
the principal, are cinereas, or summer ferias; anniversaria, yearly feriae; sanctificatis festis, of the streets and cross-ways; consecratae, votive feriae, which the magistrates promulged every year; decenales, for the expiation of a family polluted by the death of any one; inferiores, or inferior, those occasionally decreed by the magistrates; Laterae, the Lateran feriae, instituted by Tarquin the Proud, for all the Latin people, amounting annually, says Dion. Hal. to forty-seven heats, being celebrated on mount Alban, in memory of the peace concluded by Tarquin with the people of Latium. Those feriae Laterae were either ordinary or extraordinary. They continued at first only for a day; but after the expulsion of Tarquin's second dy was added, and a third after the reconciliation between the plebeians and patricians; and in process of time they were prolonged to four days. At these fests a bull was sacrificed, and each town contributed a certain quantity of meat, wine, and fruits. Mejis feriae were the firs of harvest; there were also paganae feriae, or paganae praestas, which were what we properly call the vigs, or eves of the fests; publicae, or propriae, those peculiar to the several small cities, as the familiae Claudiae, Emiliae, Juliae, &c. publicae, those observed by all in general, or for the public weal; fedentiae, those held in feast-time; latices, those kept constantly on the same day of the year; Saturnales, where we shall speak of the fests in their phase; sidereum feriae, or servilia, that is a festival held on the seventeenth of February; Sylvaca feriae, those of victory, in the month of August; sinodalae, those of the vintage, from the twentieth of August to the fifteenth of October; Pulano feriae, those of Vulcan, which fell on the twenty-second of May. See FEST.

Feria was also used among the Romans for fair-days; because it was their custom to hold their fairs on the dies feriarum, or holidays. Stru. Synt. Antiq. Rom. cap. ix. p. 425. 443. &c.

Feria is still retained in the Romish breviary, though in a feste somewhat different from the feste of the ancients, being applied to the several days of the week, beginning with Sunday; provided none of those days be a feast or fall-day. Thus, Monday is the second feria; Tuesday the third, &c.

The word feria, in this sense, is doubtlessly borrowed from the ancient feria, a day of rest. Accordingly, Sunday is the first feria; for among the ancients, the whole week were accounted festival days, by a decree of Constantine; whence those seven days were called feriae. Sunday being the first, Monday the second, &c. And this week being then accounted the first of the ecclesiastical year, they afterwards embellished themselves to call the days of the other weeks after the same manner, first, second, third, &c. feriae. Though others will have it, that the days of the week were not called feriae from the people's resting, that is, on account of being obliged to abstain from servile works; but to advertise the faithful, that they ought to abstain from sin. See Durand, De Off. Div. lib. viii. cap. 1.

There are the ordinary feriae; but besides these, they have extraordinary, or greater feriae; viz. the three last days of Psanion-week; the two days following Easter day, and Whit sunday; and the second feriae of Rogation.

FERIAL DAYS, die Feriae, or Feriæ, among the Ancients, signify holidays, or days vacant for labour, and pleasing.

But in the lat. 27 Hen. VI. cap. 5. and in Fortepee, De Laudibus LL. Angliae, ferial days are taken for working days. S. Sylvester ordained—Sabbati & dominici diei nonime retento, religios hebdomade; diei feriarum no-
to herds of young cattle, from rearing which the farmers derive a principal source of profit. Indications of coal have been discovered in many parts of the western district of this county, and in one place in particular, within a mile of Lough Erne, there is supposed to be a very valuable colliery, but the time has not yet arrived for turning to account these mineral treasures. Amongst the other substances already discovered in it, manure and fuller’s earth are mentioned. These, however, are not so valuable as the limestone, and different kinds of marls which are found in it, and are used as manure. On Lough Enniskillen’s estate, well of Lough Erne, are quarries of a grey, or brown and white marble, beautifully veined, and of a very fine grain. The farms are in many parts small, to accommodate the linen-weavers, and the fame spirit of industry is found here, as in the adjoining counties. Mr. Young, nearly 30 years ago, found them improving in their circumstances, and living more comfortably than in most other parts of the island; and the neighbourhood of Enniskillen, on the eastern side, is in particular a well-inhabited, and well-cultivated county. Lough Erne, which is supposed to occupy 45,000 acres, and the river Erne, by which its superluous waters are conveyed to the sea, have been already described in former articles of this work. (See Erne.) There are two other lakes comparatively small, but by no means of inconvenient length; one called Melvin, and the other Maeneen. Lough Maeneen lies between the counties of Fermanagh, Cavan, and Leitrim, and communicates with Lough Erne; Lough Melvin is in the northern part, and a small stream flows from it to the sea. The only town deserving notice is Enniskillen, already mentioned. (See Enniskillen.) Fermanagh returns three members to parliament, two for the county, and one for the town of Enniskillen. Young’s Tour. Beaufort’s Memoir, &c.

FERMAT, Peter De, in Biography, was born in the year 1596, and became, by his talents and acquirements, counsel of the parliament of Toulouse, in France. He was one of the ablest lawyers of the age in which he flourished: was a good poet, and well grounded in classical and modern learning, intimately conversant in antiquities, and a profound mathematician. His works were collected and published at Toulouse, in 1679, in 2 vols. folio, under the title of “Opera variæ Mathematica.” These contain Diophantus’s Treatise on Algebra; a method for the quadrature of all sorts of parabolas; a treatise on the maximum and minimum; with many smaller pieces, and his correspondence with the most celebrated geometers of his time. Fermat was as much distinguished by his integrity and impartiality in the character of a magistrate, as by his great learning and knowledge. Moretti.

FERMAT, in Geography, is a town of Asiatic Turkey, in Caramania; 12 miles S. W. of Akfher.

FERME a Ferme, in the Manager, signifies to exercise in the same place without hiring or parting.

FERMENT, of ferments, to boil, in Physic, any body, which being applied to another, produces a fermentation therein; or, any thing capable of exciting an intense motion in the parts of another; and of swelling or dilating the fame. Thus, the acid in leaven is a ferment which makes bread rise or swell. And the moisture in hay is a ferment which heats, and makes it troke. Thus also, rumet is a ferment which curdles and breaks milk; and barn, or yea, is the ferment that sets wort a working, &c.

Those things are called ferments in an illusive sense, which, when added to the liquor, only correct some fault therein, and by removing some obstacle to the fermentation, forward it by secondary means; as also such as being added in time of fermentation, make the liquor yield a large proportion of spirit, and give it a finer flavour; all these additions have the name of ferments among our distillers, but improperly. The primary use of ferments is, to save time, and make distichp of bulms, while they only occasionally and accidentally give a flavour, or add to the quantity of the spirit; and accordingly all fermentable liquors may, without the least addition, only by a due application of heat, be brought to ferment more perfectly, though it will be more slowly than with the addition of any ferment. The general ferments used on these occasions are the flowers and faces of fermentable liquors generated, thrown up, or deposited, during the time of the fermentation in that liquor, or after the end of it. There are two of those ferments, procurable in large quantities, and at a small price; these are beer-yeast, and wine-les. A prudent and artificial management of these, might render the business of the brewery for distillation, as in the business of the malt distiller, &c. much more easy and advantageous. It has always been found a great difficulty to procure these ferments in proper quantities, and preserve them always ready for use; and this has been a great discouragement to the brewers, and hence some have been obliged to contrive artificial ferments, or to form mixtures or compounds of particular fermentable ingredients; but this has been attempted without any great success, all these mixtures failing short even of the common bakers’ leaven in their use.

When the proper sort of ferment is pitched upon, the operator is next to consider its quantity, quality, and manner of application. The quantity must be proportioned to that of the liquor, to its tenacity, and the degree of flavour it is intended to give, and to the dispatch requisite in the operation. From these considerations he will be led, in order to form a rule to himself; but till such a rule is formed, or rather, in order to the forming of it, proper trial will shew how much suffices for the purpose. The way is to begin with a little, and to add more occasionally, the weight of the whole being noted beforehand; so that on weighing the remainder, after the proper quantity is taken away, it will be found how much exactly has been used out of it for the business.

Among the several ingredients of which fermentable liquors are made for the service of the distillery, treacle requires more ferment than almost any other. This is not wonderful on a just consideration of the nature of the subject, since the manner in which that concrete juice is made, must render it greatly unfit for fermentation afterwards, though the original product of a vegetable juice very much diluted to it in its own nature. The strength of the fire used in the fugar making, and its long continuance and almost immediate contact, and the lime and other alkalies used in refining the fugar, that is, in making the treacle, do confiderably, imbibe, and scorch the body of this juice, and abhor its acid, that it is fearly to be expected thus it should ferment at all, even with the addition of opal, or other powerful saline and acid or acrid stimulants, which tend to break the viscous and acid connections of the particles.

The greatest circumspection and care are necessary in regard to the quality of the ferment, if a pure and well-flavoured spirit be required. It must be chosen perfectly sweet and fresh, for all ferments are liable to grow muddy and corrupt; and if in this state they are mixed with the fermentable liquor, they will communicate their nauseous and filthy flavour to the spirit, which will scarcely ever be got off by any subsequent refining. If the ferment be foul, it must by no means be used with any liquor, for it will...
communicate its flavour to the whole, and even prevent its rising to a head, and give it an acceous, instead of a vinous tendency. When the proper quantity of a suitable and well-conditioned ferment is got ready, it must be put to the fermentable liquor in a state barely tepid, or fearfully lukewarm. The best manner of putting them together, so as to make the fermentation strong and quick, is this. When the ferment is solid, it must be broken to pieces, and gently thinned with some of the warm liquor; but a complete or uniform solution of it is not to be expected or desired, as this would weaken its efficacy for the future humour. The whole intended quantity being thus loosely mixed in some of the lukewarm liquor, and kept near the fire, or else where in a tepid state, free from too rude commotion of the external air, more of the infusible warm liquor ought at proper intervals to be brought in, till thus by degrees the whole quantity is set at work together.

When the whole is thus set at work, and secured in a proper degree of warmth, and kept from a too free intercourse with the external air, it becomes as it were the sole humours of nature to finish the operation, and render the liquor fit for the full. In this easy manner the whole end of fermentation would be answered. But during the whole course of the operation, there are several other things that may be added with some particular view, as either to increase the quantity of spirit, or give it some agreeable flavour. These additions may sometimes require some alteration in the general method laid down above, though upon the whole it is right. Shaw's Essay on Distilling. See Additions.

Ferments in the Earth. It is very probable, that the natural ferments in the earth may be of more consequence than is generally supposed, and tend to elucidate many things, which at present appear very mysterious. The different fruitfulness of different spots of the same part of land may be owing to this, as also the different temperature of air at the same time in places very little distant from one another. The effluvia sent up by some of these, not only diffuse snow that falls on them, but even melt it in the air as it approaches, and cause it to fall in rain, not in snow. And often in two places within a mile or two of each other, there shall be a disparity of heat and cold no way else to be accounted for, since there is often no difference of shade or shelter.

In Scotland there are large tracts of land, where the ferment is so strong, that the earth lets a person up to the ankles as he walks; and generally, at about a foot deep under this, there is found a stratum of pebbles, so close rammed together, that they form an artificial cauldron. This land, though of no greater depth than a foot, is found very rich for garden-plants, and even for fruit-trees.

FERMENTARIUM, or Fermentaceum, a denomination which those of the Latin church have given to the Greeks, on account of their conserning and using leavened or fermented bread in the eucharist.

As the Greeks call the Latins azymites, the Latins, in return, call them fermentarii.

FERMENTATION. The important processes by which fermentable solutions are converted into intoxicating liquors, is one of the most complicated in chemistry, and the precise cause of this change is as yet very imperfectly known. In the present article we shall notice the conditions requisite to fermentation, the appearances that occur during the process, and the efficient product of it, referring for the articles Spirits, Distilled, and Wine, some farther particulars.

The only two substances indispensably requisite to the formation of a fermentable liquor are water and sugar. No vegetable juice will ferment that is not sensibly sweet, and from which a portion of sugar may not be extracted by chemical means. The strength of vinous liquors (other circumstances being the same) is in direct proportion to the quantity of sugar contained in them before fermentation. The addition of sugar to the weakly fermentable juices will enable them to produce a strong full-bodied liquor, and the very effluence of this procists is the disappearance of the sugar, and the consequent production of alcohol.

With regard to the water, it does not appear how far this is an active ingredient in vinous fermentation, though it is fully ascertained the that a particular degree of dilution is necessary to this process: this confidence exists naturally in the juice of grapes, in the saccharine sap of many trees, and of other spontaneously fermentable liquors; and if these very liquors be deprived by gentle evaporation of a considerable portion of their water, the residue will not ferment till the requisite confidence is restored by the addition of a fresh portion of water. On the other hand, if a saccharine mucilage is too dilute, the fermentation is very languid and imperfect.

But pure sugar and water alone will not ferment, and therefore some other substance is also requisite. To this point the attention of chemists has been often directed, but hitherto with but little success; indeed, the general result of the experiments that have been made is, that several substances, very different in their other properties, will answer almost equally well as a ferment. Must, or the recent juice of the grape, contains, beside sugar and water, a quantity of vegetable acid, chiefly the tartaricus, and one or more substances obscurely denominated under the names of mucilage and extract. Each of these is requisite to the fermentation of must; for if any one is abolished the process will not take place. A warm temperature is also requisite to fermentation. This varies according to the natural fermentability of the materials, and their bulk. Thus, grape-juice will readily begin to ferment at the temperature of about 65°, and the process is strong and vehement at 7° or 8°. The expressed juice of the sugar-cane is so exceedingly prone to fermentation, that in the climate of the West Indies the process would begin in ten minutes, or a quarter of an hour; and hence, as fermentation is the destruction of the sugar, it is necessary, in making sugar, to counteract this tendency in the expressed juice as speedily as possible, which is effected merely by bringing it to a scalding heat. A low temperature, as that of freezing water, is equally efficacious in preventing or arresting the progress of fermentation, so that all domestic processes of this kind are performed within doors, or near a fire, and in the large way chilling must be particularly avoided; but as the art of fermentation produces a considerable heat, the liquor within the vessel being several degrees warmer than the surrounding air, large masses of ice are of course left affected by the external cold, and will ferment at a low temperature.

The first signs of fermentation are, a gentle intestine motion, the rising of small bubbles to the top of the liquor, and a whitish turbid appearance. This is soon followed by the collection of a froth, or head, consisting of a multitude of air-bubbles entangled in the liquor, which, as the process advances, rise slowly to a considerable height, forming a white dense permanent froth. A very large portion of the gas also escapes, which has a strong, penetrating, agreeable, vinous odour. The temperature of the liquor at the same time increases to several degrees above that of the external air, and continues so during the whole of the process. Sooner
Fermentation.

Sooner or later these appearances gradually subside; the head of the foam settles into a dense froth, and on turning it aside, the liquor beneath appears much clearer and nearly as ret, having deposited a copious sediment, and from being vicid and faccharine is now become vinous, intoxicating, thinner, and of less specific gravity.

The proceeds of fermentation, however, does not terminate suddenly, but goes off very gradually, the liquor continuing to work or throw up foam, to clarify, to attenuate, and more completely to lose its fugar, which at last can no longer be discerned by the taste, or detected by chemical analysis. The vinous liquor, when complete, of sufficient strength and well fermented, will now keep for a great length of time in vessels covered from the air, and undergoes comparatively little further alteration, except in becoming more perfectly limpid by the deposition of an additional quantity of sediment.

The gas of fermenting liquors has been long known to consist for the most part of carboneic acid; it will, therefore, extinguish a candle, defroy animal life, convert caustic alcalies into alkaline carbonates, and the like. But, besides the carbonic acid, it has been proved by Scheele to hold in solution a sensible quantity of alcohol, and Proust has detected in it a portion of azot.

Mr. Collier (Manche. Tr. 5) has further shown that in this gas are contained all the requisites for vinous fermentation. He passed the whole of the gas from a ninety gallon fermenting tank into a cañk of water, and divided the liquor thus impressed into three parts, of which one being immediately distilled, afforded a small quantity of alcohol; to the second was added some yeast, by which a new fermentation was excited, and the abundant product of distilled spirit was nearly doubled, and the third being faffered to ferment a longer time, yielded vinegar.

The attenuation of liquors, or the diminution of their specific gravity by fermentation, is very striking. This is shown by the hydrometer, which sways much deeper in fermented liquor than in the same materials before fermentation. Much of this attenuation is, doubtless, owing to the destruction of the fugar, which, dissolved in water, adds to its density, and to the consequent production of alcohol, which, on the contrary, by mixture with water, diminishes the density of the compound. The extract, or meâlage, also appears to be in some degree destroyed by fermentation, for the gelatious confluence of thick liquors is much lessened by this process: the destruction of this principle, however, is by no means complete as of the fugar, many of the full-bodied ales, for example, retaining much of their original examinines and gelatious density even after having undergone a very perfect fermentation.

It has been doubted whether the alcohol of vinous liquors exists in them ready formed, or in some intermediate state, requiring the boiling heat of distillation for its complete development. It is not easy to fix upon an unexceptionable mode of deciding this question. It has been argued by Fabroni, in favour of alcohol being a product, and not an extract from wine, that wine cannot be again formed by adding the distilled alcohol to the residue left behind in the retort: he also affirms, that if a small portion of alcohol is added to wine, it may be separated again almost entirely by carbonating potash, but that this feat will not separate any alcohol from wine in its natural state. This last fact, however, only shows that the union of the alcohols with the other parts of the wine, is too strong to be broken by simple affinity, without the assistance of heat; and, as to the former, it is highly probable that the boiling heat operates some change on the other constituents of wine, the effect of which cannot be done away by the more return of the spirit that has been driven off. This opinion, therefore, though by no means improvable, requires further confirmation.

The production of alcohol seems to be one of the last effects, or the completion of the process of fermentation; for if the liquor is distilled while yet in a state of high fermentation, it will not yield a drop of alcohol.

The atmospheric air seems to have no share whatever in vinous fermentation, for it will take place full as well in closed as in open vessels, provided space is allowed for the great expansion of the materials, and the copious production of gas. Indeed Mr. Collier found, by direct experiment, that more spirit is procured by close than by open fermentation.

In three separate experiments, in each of which an equal quantity of wort and yeast were fermented, under circumstances precisely similar, with the single exception, that in one the vessel was open, and in the other closed, (the gas having no exit but through a tube dipping in water,) he found, on distilling each fermented liquor, and drawing off the same bulk of spirit from each, that from the closed vessels was constantly of less specific gravity, and, therefore, richer in alcohol than the other. Where the spirit from the open vessel was 74 degrees below proof, that from the closed vessel was 56 degrees; where the former was 83, the latter was 65; and where it was 105, the other was 93.

The theory of vinous fermentation is still involved in great difficulty, on account of the very compound nature of the substances employed, and their great tendency to decomposition in various ways and proportions.

The results of Lavoisier's experiments should not pass unnoticed, though it is obvious that much too great simplicity is attempted in the explanation of a process which every circumstance shews to be very complicated. The simple point to which the experiments of this able inquirer tend, is (setting aside all other agents) to explain how sugar becomes converted into carbonic acid and alcohol, which, after all, is the characteristic phenomenon of vinous fermentation.

The entire products of sugar, yeast, and water, fermented in close vessels, are stated to be carbonic acid, alcohol, and water, together with a small portion of acetic acid, and from these facts the following theory is deduced. Sugar is composed of eight parts hydrogen, 64 oxygen, and 28 carbon, and the process of fermentation effects a change merely in the arrangement of the constituent parts of the fugar, converting one portion into carbonic acid, and the other into alcohol; and hence (as carbonic acid contains only carbon, with a large proportion of oxygen,) the portion which is left must contain all the hydrogen, part of the carbon, and a very small proportion of oxygen; or, in other words, by this new arrangement of the ingredients of the fugar, one portion, namely, the carboneic acid, is totally deprived of hydrogen, and overloaded with oxygen, while the other portion, namely the alcohol, abundant in hydrogen, and deficient in oxygen, the carbon being shared between the two products in nearly an equal proportion with regard to their respective quantities.

No theory more plausible than the above has perhaps hitherto been offered to the general phenomenon of vinous fermentation, though it is very defective in many essential parts, and even does not correspond with the alleged composition of alcohol, given by the same chemist in another part of his enquiries.

The great question remaining for future inquirers to determine is, what the substance or circumstances, which diposes fugar to ferve: for it has been proved that fugar will not of itself begin this spontaneous change into carboneic acid.
Fermentation.

Acid and alcohol; though, when once begun, the process will probably go on without further assistance.

It has been already mentioned, that both extractive matter and an acid are present in every known instance of vinous fermentation; and, for any thing that appears to the contrary, both of them are necessary, though the requisite quantity of each is very small compared to the sugar; therefore the strength or body of the fermented liquor is in direct proportion to the quantity of sugar alone, and there is good reason to suppose that the extractive matter and the acid are only accasy ingredients, though still essential, as being those without which the vinous decomposition of sugar cannot be effected.

It has been supposed that it is the vegeto-animal extract, as it has been called, which exists in the fermentable juices of vegetables, that causes the first change in the sugar. The precise nature of this vegeto-animal matter is not very well known; it may be supposed to be similar to the gluten of wheat, but intimately combined with the faccharine mucilage, and hence extremely susceptible of spontaneous change. The chief, if not the only, proof of its existence in many of these combinations, is the production of a quantity of ammonia during its decomposition by heat, which alkali is almost always formed by the action of fire, and indicates in the substance which yields it the presence of azot.

Some of the commonest fermenting ingredients, as the sweet infusion of malt, technically called wort, is well known, will hardly enter into fermentation without the addition of yeast; and hence chemists have sought in this substance for the principle which gives the first impulse to the fermentation of sugar.

The analysis of yeast presents a vast variety of ingredients, the chief of which are the carboonic, acetie, and malic acids, mucilage, sugar, and gluten. Of these the latter is in the largest proportion, which would seem to give much weight to the opinion of the great share which the azotic ingredient has in inducing fermentation.

Yet Mr. Henry found by a series of very interesting experiments, that malt infusion might be made to enter into compleat fermentation by impregnating it with carboonic acid prepared from chalk and sulphuric acid, and the liquor thus fermented gave a yeast which made perfect bread, gave alcohol by distillation, and vinegar by further keeping. The wort itself undoubtedly contained all the ingredients of yeast, since this substance was produced during the fermentation, but the experiment is decisive to prove that no addition of azotic extract is required to begin fermentation in materials naturally fermentable, though, when once begun, the yeast, as fast as it was produced, must have affixed in the fermentation then going on. The evidence for the necessity of an acid to begin fermentation is therefore more decisive, but it is still doubtful whether any particular one is required, or whether there are not several which will answer the purpose. In Mr. Henry's experiments the acid employed was the carboonic, and, from the arrangement of the apparatus, probably a small portion of sulphuric was also carried in with it. But in grape juice there is no proof of the existence of carboonic acid ready formed, though the tartaric, malic, and other vegetable acids contain within themselves the ingredients of carboonic acid, and are chiefly and ultimately reducible into this acid. Yeast will even induce fermentation after it is prelled and dried into solid cakes, (a practice not uncommon, as it will keep for a great length of time in this form,) but after this operation it can hardly contain any carboonic acid ready formed, though with abundant tendency to produce it by the first mutual action of its constituent parts. Many interesting enquiries therefore remain to be carried on before we can have a full and satisfactory theory of the important processes of vinous fermentation.

Fermentation, Acetous. See Acetous Acid, and Vinegar.

Fermentation, Putrid. See Putrefaction.

Fermentation, Bituminous, in Geology, denotes a particular change, which, according to the opinion of Mr. James Parkinson, (Organic Remains, vol. i. p. 184.) is peculiar to vegetable matter placed in such situations, as not only exclude the external air, and secure the presence of moisture, but prevent the escape of the more volatile principles, and which terminates in the formation of those substances called bitumens." This author, after giving a concise, but luminous account of the fermentation, the vinous, the acetous, and the putrid fermentation, to which most vegetable substances are progressively liable, by the modified admission of atmospheric air, thus proceeds; "But if, instead of being thus exposed to the influence of the air, a mass of dead vegetable matter be accumulated in such situations as allow of the admission of water, but in which the companions of the superincumbent flatus of earth, not only excludes the external air, but the disengaged gaseous matters are prevented from escaping, the bituminous fermentation takes place, and bituminous matters are formed in various degrees of maturity and purenes, according to the stage at which the process may have arrived, or the extraneous matters which may have been admitted." Our author, however, admits, that a complete history of all the phenomena which occur during the whole of the operation cannot possibly be expected to be made out, but the proofs of its existence must be obtained by inference, and from analogy comparing it with the other species of fermentation; and he thus continues: "the fulbance, then, which I conceive to be entirely dependent on, and actually the product of, this process, is bitumen; a fulbance which manifests, upon examination, all those properties which might, a priori, be expected to be found in a body constituted under the particular circumstances which I have presumed to have directed its formation.

In the first stage of the vinous fermentation, we perceive that a considerable portion of the more volatile parts of the mixture is diffusitated, and that it is only by the careful preservation of the remainder that the accomplishment of this process is effected. In the acetofermentation this escape of the volatile parts is continued through the whole of the process, and occasions the great difference which exists between the two products. In the first of these species of fermentation, carbon, that principle which always seems to affect that mode of combustion, observable in ignited charcoal, where flame is not present, is, we have remarked, dissipated in very large quantities, by which its dose in the mixture must be considerably diminished; whilst, should hydrogen even be supposed to escape in a similar proportion, still, from the decomposition of the water, sufficient of this principle (which I will call the principle of inflammability) will be yielded, to give the spirituous and very inflammable product which we find to be the result of this process. In the latter of these species of fermentations, in which the dissipation of the volatile matters is carried to the utmost extent which the degree of temperature will admit, the mixture seems to be deprived of almost the whole of its hydrogen; except, perhaps, just so much as is left in combination with the colouring principle, and the water, whilst the oxygen is attracted, nearly in the same proportion, by the carbon from the atmosphere, and from the very considerab
considerable dose of this acidifying principle; and, from
some peculiar modification of their union, the product, vi-
negar, results, possessing a high degree of acidity, but not
the least degree of inflammability.

"We will now examine the changes which may be ex-
pected to result from the decomposition of vegetable mat-
ters placed in subterranean situations, and considering the
properties which are posseased by the supposesed pro-
duct of the bituminous fermentation, we shall be enabled,
especially by recollecting what has been just laid of the
other species of fermentation, to determine whether it
is right to admit of the existence of such a species of fer-
mentation or not.

"Secured on every side by the surrounding earth,
the mass of vegetable matter is preserved, at it were, in
a well-closed vessel; hardly any escape being permitted to any
of its more volatile particles, nor any admission of extrane-
ous matters allowed, except of such as are introduced with
the water which may infuse itself by soaking through the
interstices of the earthy particles, compounding the several fats which
include it.

"It is decreed, that a strong disposition to separate, and
to unite in another order, shall secure the necessary decom-
position of dead organized matter, which, according to the
economy of nature, is but to possease a short and transient
cohesion. Agreeable to this law, this mass of vegetable
matter, now deprived of the energy of vegetable life, must
undergo some change; but from the closeness of its pre-
ferration, it cannot admit that escape of the gaseous
matters on which the commencement of the vinous, acetic, or
putrid fermentations depend; another process is therefore
instituted. The hydrogen, carbon, and oxygen are dif-
gaged from their former attachments, but prevented from
flying off in a gaseous state, are obliged again to unite,
and to enter into new combinations.

"Under these particular circumstances a substance may
be expected to be formed, containing a considerable portion
of these principles so abundant in vegetable matter. In this
respect, there undoubtedly may be discovered a remarkable
agreement between the supposed product of this fermenta-
tion, and the hypothesis by which its formation is attempted
to be explained; hence, in all bituminous substances the abun-
dant existence of these three principles has been sufficiently
proved by analysis.

"In this, as in every other species of fermentation, a con-
derable difference may exist, as to the degree of perfection
to which the process may proceed, and of course, as to the
degree of perfection which the product may possease.

"Thus I expec to shew, that, according to length of
time, exclusion from the air, and the existence of other favour-
able circumstances, will these bituminous substances be
found in several approaches to that state, to which
the laws of nature seem to have particularly designed them.

"Peat, that combustible and inflammable substance,
generally found in considerable masses at a little depth be-
neath the surface of the earth, posseasing chemical properties
effectually different from every other substance which has
not derived its existence from the same origin, appears to be
the first product of this kind of fermentation, and to have
been formed in situations not favourable to the rapid com-
pletion of this process. The celerity with which this pro-
cess is accomplished must depend on the closeness with
which the gaseous principles are fixed; but it should be
considered, that such peat-bogs as are, comparatively, but
of modern formation, are covered by a coat of vegetable
mould, in a humid state, of no considerable degree of
thickness, and therefore the escape of the more volatile
principles, and the admission of atmospheric air, are only
partially prevented; the process must therefore be carried on
with much less effect, than in those cases which will be here-
after mentioned, where vast masses of vegetable matters have
been suddenly buried under a considerable thickness of earthy
deposition.

"The abundance of hydrogen, carbon, and oxygen, in
peat, is demonstrated by its analysis. By the early anal-
ysis of Schoenkinds we learn, that it yields an oil much
resembling the oil of amber, with an acid liquor. Mont.
Fourcroy relates, that, on exposing peat to the action of
heat, in a dilatatory apparatus, a yellow or reddish acid
water is obtained, an oil of a most disagreeable odour, with
carbonate of ammonia, and carbonated hydrogen gas, also
smelling most disagreeably; a coal being left, which is fre-
quently pyrophoric, and which yields, after incineration,
muriate and sulphate of soda, and of potash, mixed with the
phosphatc and sulphate of lime, and with the oxys of
iron and of manganese.

"The prevalence of hydrogen in this substance is fully
displayed by the foregoing analysis, since not only enough
exists for the formation of this peculiar oil, but a consider-
able quantity of this principle is also diffused in a gaseous
form; the agreement, therefore, between this substance, and
what might, a priori, have been supposed, would be the pro-
duct of a vegetable matter placed under these particular
circumstances, appears to be evident. The original mode
of existence which belonged to this substance is suffi-
ciently marked by the great quantities of vegetable sub-
stances which are found in it, which have not suffered such
an alteration, as to hinder the immediately tracing them to
their true origin. That this substance has been subjected to
the influence of the two circumstances, which seem essential
to this peculiar fermentation, the preference of moisture
and subterranean situation, must appear to plain from the state
in which the peat masses are found, that, on this point, not a
word need be added. Peat, therefore, I presume, we may
regard as a vegetable secondary fossil; having been formed
from vegetable matter, changed in its nature and properties
by a certain fermentation, which had been carried on in the
mineral regions.

The further prosecution of this theory by our author,
in order to account for the formation of amber, and jet, &c.
are too long for our purpose, but are well worthy the
perusal of those who wish to become acquainted fully with
this subject.

FERMENTED LIQUORS are esteemed great antidotes
to putrefaction; accordingly the abstinence from them is in-
stituted as one cause why the Turks are more subject to
other people to the plague, and other contagious diseas-
ers. It is likewise observed, that beer, wine, and spiritu-
sous liquors, coming more into general use, has been one
great means of suppresing putrid diseases. See Pringle's
Obser. on the Diseases of the Army, p. 286. 294. and
Maclure's Eff. eff. 3. See Antiseptic, Chowder, and
Spruce beer, and Wort.

FERMO, Ital. as canto fermo, or plain-chant, in Er-
edescfoglirl Singing, is used in opposition to canto figna-
co, or figurative song. Roullet was of opinion that the Roman,
or Gregorian chant, is a precious relic, though much dis-
figured, of the ancient Greek music, which, after having
passed through the hands of the barbarians, has not lost all
its trill beauties. Enough remains still to make it far pre-
ferable for the use to which it is dedicated, to that effemiate
and theatrical, or flat and muskine music, which has been
substituted to it in some churches, without gravity, without
taste,
tales, propriety, or respect for the place which they gave

to.

Canto ferme is written only on four lines in the Roman
milials, and only two cles are used, the base clef of F, and
the clef of C, which are moveable, and only one flat upon B,
and two kinds of notes, the long and square note, to which
a tail is sometimes added, and the breve in the lozenge form,
but all black. These are called Gregorian notes, supposèd
to have been invented or adopted by St. Gregory, the first
pope of that name. St. Ambrose, archbishop of Milan, is
said to have invented the Ambrosian chant; or at least to
have brought it from Antioch, and to have established it in
his church at Milan, a considerable time before the pontifical
reign of Gregory, who perfected it, and gave it the form which it full preserves at Rome, and in other churches
where the Roman chant is still practised. See Plain
Chant, Ambrosian Chant, and Gregorian Notes.

Fermo, in Geography, a city of Italy, in the marquisate
of Ancona, situated near the coast of the Adriatic; the
site of an archbishopric, erected in the year 1269, by pope
Sixtus V. It contains 16 churches and 16 convents; 26
miles S. S. E. of Ancona. N. lat. 43° G. E. long. 13°
40'.

FERMOR, William, in Biography, count Von, a
celebrated Russian general, was born at Pleskow, on the
28th of September, 1704. He was educated for the military
profession, and entered the army as a common bombardier
in the year 1729, and was so rapidly promoted, that in the
year 1729, he became adjutant-general to count Von Mun-
nee. At Dantzic he formed an acquaintance with Frederic
William, king of Prussia, who conferred upon him the
order of the Gendaróte. He greatly distinguished himself
in the Turkish war of 1735, and was promoted to the rank
of general, and commandant of Holstein. In 1746, he was
appointed inspector of building; and the imperial palace,
a master-piece of art, was built under his direction. In
1753, he was made commander-in-chief, and shortly after,
for his conduct in Prussia, he was raised to the dignity of a
count of the empire by Francis I. In the following year
he fought the celebrated battle of Zorndorf, with Frederic
II. king of Prussia. Being fatished with the reputation he
had gained, he requested leave to retire, and though this
was granted him, he was called again into active service,
and was finally made governor-general of Smolensko, and
member of the supreme senate. After this he rebuilt some
towns; when he again retired, resigning all his employ-
ments, and died in 1771, on his estate of Nienau, where he
had erected an elegant church. Gen. Birg.

FERMOSELLA, in Geography, a town of Spain, in
the province of Leon, 30 miles W. S. W. of Zamora.

FernoY, a very handsome and flourishing market and
port-town of the county of Cork, Ireland, which affords
a striking instance of what may be effected by the exertions
of an individual. Less than twenty years ago FerneY was
a miserable village, with a long narrow bridge over the fine
river Blackwater, and one of the last places at which a
traveller would think of stopping for refreshments of any
kind. At present it is a regularly built town, with a large
barrack for two regiments of infantry, and another for
cavalry adjoining to it on the opposite side of the river.
The bridge has been widened; a church of elegant con-
duction, and well situated, a large school-house, a market-
house, and a felloi-house, which also serves occasionally for
an assembly room, and theatre, have been built, and there
are two good inns, with some of the best poll-carriages to be met
with in Ireland. There are also an extensive porter brewery,
a flour-mill, a wooden manufactory, a bank, and several
respectable shops. This change has been effected by the
exertions of Jvotes Anderen, esq., who purchased the greater
part of the old village, and has made Ferney a subject of
admiration and allmendment to those who remember what it
was, and who know what Irish towns in general are. To
the same individual the south of Ireland is indebted for
mail-coaches and the improvement of the roads. Ferney
is on the road from Dublin to Cork, being 107 Irish miles
from the former, and 17 from the latter of the chief cities.

FERN, in Agriculture, the name of a most troublesome
weed, which it is very difficult to destroy where it has a deep
foil to root in. The best method of killing it in gravel lands
is, probably, by cutting it often while it is in its green
and succulent state, as in the spring or the beginning of
summer. The fern thus cut, when full of sap, and left to
rot upon the ground, tends greatly to improve the foil, by
rendering it more mellow, or if it be burnt when so cut, it
will yield a much greater quantity of saline matter than any
other sort of vegetable.

This is, however, a wasteful practice, and by no means so
good as that of collecting it and backing it up, for the pur-
pose of littering the foil-yards during the time that cattle
are kept in them, as by such a method, a large flock of
valuable manure may be accumulated, the fern retaining
the moisture and liquid animalized matters better than straw,
by which means it becomes in a flate fit for manure much
sooner than is commonly supposèd. Besides, it forms an
excellent warm litter for the live-flock in such situations.

In tillage lands the best method of eradicating this plant
is by repeated deep ploughing, so as to effectually break
the matted roots of it, which, often in the more mellow
loamy foils, stick to the depth of several feet. When they
are once well broken, they readily decay in the ground, and
add to its fertility.

Fern is commonly met with in breaking up waste lands
where the foil is of the friable, hazel, loamy quality.

The ashes of this plant become an excellent manure for
all the lighter sorts of foil when employed as a top-dressing.
See Manure.

FERN WEB, in Rural Economy, is a term applied to a kind
of small insect of the chaffer sort, which is highly injurious
to the early blossom of the apple-tree.

FERNS. See Filices.

FERN, Common Male and Female, in Botany. See Poly-
Podium.

The common female fern is a very mischievous and trou-
blesome weed to the farmers, being very difficult to destroy,
where it has any depth of ground to root in. Its roots will
often penetrate to eight feet deep, and spreading a great
way, they will rife again to the surface, and send up new
plants at a considerable distance. In gravel land, the best
way of destroying them is mowing the grass three times a year,
in spring, in May, and in August. Dung and ashes are very
good manure for lands which abound with them; but the
best of all things for destroying them is urine. Fern cut up
when the sap is in it, and laid to rot upon the ground, is
a very good manure for land, and will mellow it to as to pre-
vent its binding. Trees planted where fern grows, are ob-
erved to thrive very much, even though it be upon a hot
gravel; the reason of this is, that the fern shades the roots,
and keeps them moist and cool. Mortimer's Husbandry,
p. 276.

Scotch deep put into land where there is much fern grow-
ing among the grass generally destroy it in a little time,
partly by their dung and urine, and partly by treading it
down.

The root of the male fern is greatly recommended by med-
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dialed writers, as a cure for rickets in children. Some also give it in powder, against worms; and it has the fame virtues against the stone and gravel, with the rest of the genus of capillary plants, ascribed to it. It was frequently prescribed by the ancients in diet drinks, for removing obstructions, and in chronic cures of all kinds, but is much diluted at present. Lemeruc, Dict. des Droog.

All the species of fern, and other vegetables, which carry their feed on the back of their leaves, as moonwort, and the like plants, poiffels the fame general virtues of drying and strengthening the vifeen, especially the fpiken.

Fern, Flowering. See Osmunda.
Fern, Comnon or True Mafes. See Asplenium.
Fern, Mules. See Hémionitae.
Fern, Sacred or Scandia.
Fern-gale. The poor people in many parts of the north of England use fern instead of soap for washing their cloaths; they cut the plant green, and then burn it to ashes, and make them up into balls with water; they dry thefe in the sun, and keep them ready for use.

The ashes of the common female fern produce a very singular phenomenon in the common way of treating them and their falt. If a large quantity of these ashes be procured, and the falt to the quantity of several pounds extracted from them in the common way, it will exceed better than in smaller quantities. The greater part of this falt being dried, if the remainder, which is more moif, be exposed to the air to receive fome of the vapours of it, this will soon become fluid, or an oil, as it is more improperly called, per deliquium. The falt of the fuxium, which will be very heavy, and of a deep blood-red, or charet-colour, being left by in a glafs-veffel untopped for five or fix months, there will be found at the bottom of the liquor a very large quantity of falt precipitated to the thickness of about two inches on the bottom of the veffel. The lower part of this falt is of a mafon's, and appear difcoloured; but the upper part will be extremely pure and white. From the surface of this part there will grow up a number of plants, in appearance flandering creft, and at small distances from one another. These are only the last cryftallizations of the fubfiding or separating falt, but they have a regularity that is very surprifing; they vary considerably in fize and weight, but are all of the fame shape, exactly reftiming fo many plants of the common unbranched fern, funding out a great number of regular leaves on each fide the ftem. These ramifications of the falt will remain many weeks in this per- feflion, if the vein be not flurred: but they are fo tender, that the leaf motion detroyes them, and they after this never form themselves again. Phil. Tynt. N. 105.

Fern-oil, in Pottery, a name given by our merchants who have been in China to a fort of fannah, which the Chinese ufe in their porcellain manufaftures. It is also called lime-oil, and is a thing fo eafily made, that it would be worth attempting what might be done with it, in our imitations of the porcellain-made in this manner: they take a large quantity of fern well dried, and spreading a covering of it over a piece of ground sufficient for the quantity of oil they intend to make, they lay upon this a coat of large lime-fones, newly calcined into lime; on these they sprinkle with the hand a fmall quantity of water just to flake them. They cover this bed of lime with another of fern; and fo on, till they have laid it to eight or ten feet high; they then let fire to the fern, this burns away in a little time, and leaves a mixture of the lime and its own ashes. This mixture is laid in the fame manner between beds of more fern, and burnt again. This operation is repeated five or fix times. Obf. far les Couton, de l'Afie.

When the falt calculation is fluffed, the mixture of lime and ashes is carefully gathered up, and thrown into large veffels of water, and with every hundred weight of it they put in one pound weight of keckio: they fift the whole together; and when the coarser part has fubfided to the bottom, they take off the finer, which swims at the top in form of a fine cream, and putting it into another veffel of water, they let it fubfide to the bottom by long flading: they then pour off the water, and fave the richbium in form of a thick oil.

This they mix with the oil of feme, prepared by powdering and washing in the fame manner a particular fort of doses, and with this they cover all the veffels that they intend to varnish. The fern ashes have a very great fhare in the advantage that this oil has over our common varnish; and the Chinese tell us, that they once instead of fern used the wood of a tree, called f ogłi, and they fuppofe that the superiority of the old porcellain over the prefent, is owing to the ufe of this tree instead of the fern: but it is now too fcarce among them. The new manufcript which was esta- blifhed at Briifol exceeds every thing, that has been done of the like kind, in the beauty of the varnishings: and it is faid, they have founded their advantage on an imitation of this and the Chinese oil of fern. These two oils, as they are called, are always mixed together; and they must be careful- ly preferved of the fame degree of thicknefs, or else all the varnifhing will not be even.

Ferns, Petrified, in Natural History, are a kind of fossil plants found in the flata accompanying coal, and bearing some reffoniance to ferns. Mr. William Martin, in his "Petrifiaca Derblifini," defcribes and figures three kinds of these, as found in the Derbyshire coal flata, and in iron-ron- nodules; thefè he denotes phylophilth, ficipes fteptates, ficipes auriformis, and ommunda regalis, the latter in con- compliance with the practice of former writers, but fems him- felf to doubt the identity of any of the three with recent plants of any kind. In Parkinson's Organic Remains, let- ter 45, &c. of vol. i, a recital of much which has been written on this fubjedt will be found, accompanied also with doubts of fuch pretended identity: also, in W. Martin's "Outlines of the knowledge of Extraneous Petifls," pages 63, 64, 84, &c.

Fern, in Geography, a town of Scotland, in the county of Angus or Forfar; 6 miles W. of Brecbin.
FERNSBUC. See Brazil Wood.
FERNSBUCO, in Geography, also called Olna, a caputancy or province of Brazil, lying along the coast of the Atlantic, and abounding in sugar, cotton, Brazil wood, cattle, and hides.
FERNSBUCO, or Olinda, as it was called by the Dutch, the chief town of the fore-mentioned province: the fite of a bishop, fuffragan of St. Salvador; and having a ready convenient harbour on the coast of the Atlantic. By the Por- tuguese this town is called Fernambuco. See L. 826; Phil. Tynt. N. 161. 16.

FERNANDEZ, Anthony, in Biography, was born at Coimbra in 1558, admitted in early life a member of the order of Jesus, and having completed his studies to the satisfaction of his superiors, had the degree of doctor of divinity conferred upon him by the university of Evora, where he delivered lectures on the fritures of the Old and New Testament with considerable reputation. His talents rendered him an object fit to be sent out on a mission to the Portuguese settlements; he went to Goa, where he ob- obtained much respect as superior of his order in that city. On his return to Europe he devoted his time to the duties of the pulpit, and to write commentaries on the bible. His principal
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Fernandez, Alphonso, was born at Palencia, in Leon, in the year 1572; and appointed preacher-general to the Dominican order of monks in 1608. As an author, he wrote "An Ecclesiastical History of his own Time"; "A Treatise on the Benefits conferred by his Order on the kingdom of Spain by the institution of the Inquisition;" "Annals of the Town and Church of Palencia;" these with a "History of the Devotion of the Rotary," were published in the Spanish language. He published other works in the Latin tongue, and was employed in compiling ecclesiastical annals of Spain, which with other works have been published since his death. Moreri.

Fernandez, Juan, in Geography, an island in the southern Pacific ocean, first seen in 1563, and so called from its discoverer, is of an irregular shape, about five miles long, and between one and two broad. It is distant from Chili about 110 leagues. This island has been frequently described by the navigators of the Pacific, and particularly in the account of Anfon's voyage; it was a place of refort for refreshments, especially antiscorbutic vegetables, with which it abounds; and the freebooters of former times made it a place of refort for the rendezvous of their forces, or the division of their spoil. At a convenient distance from the coast of Peru, unsettled and unfortified, abounding in almost every requisite for re-fitting, re-vegetation, watering, and watering, it became not only a desirable station, but was long an unsuspected or deserted retreat. The Spaniards, however, at length directed their attention to it, and in 1792 or 1793 made a settlement upon it. In the latter year, captain Carteret on his voyage round the world, upon opening Cumberland bay, was surprised to find the island in possession of the Spaniards, who had built a fort, on which the Spanish colours were flying, and some cannon mounted. Many cattle were seen on the hills, and about 20 houses in different parts of the island. Carteret had no communication with the shore, but failed immediately for Mafauro. In the year 1792, it was visited by lieutenant John Mofs of the royal navy, who then commanded a ship in the southern whale and seal fishery. He approached it on the west side, and came abreast of the north point; but, unappraized of its having been settled by the Spaniards, he proposed to catch fish, and to examine if it afforded safe anchorage. But hauling his boat round the N.W. point, he found the place fortified, and saw a small village in the valley. His request, presented to the governor for leave to anchor and to fish, was not formally granted; however, keeping his boat out of the way of the guns, he caught as many fish as served the whole ship's company. From him we learn, that, in making the island from the westward, it appears elevated at the N. end, and slopes away towards the south, with a remarkable ridge, or large rock, detached about half a mile off the S. point. At a distance the whole island appears like an entire rock; but on nearer access the interfering valleys discover themselves, and display a fine scene of verdure, being covered with wood. The west side affords no anchorage, nor any landing place, the cliffs rising almost perpendicular from the sea. When abreast of the N.W. point, the first valley or landing-place opens, where there is anchorage in 14 fathom water, but in an exposed situation. Here the Spaniards have a guard-house and one gun. About half a mile to the E. N. E. is the great bay, (Cumberland bay of the Buccaneers,) which is land-locked from E. to N.W. by W.; but there is no anchorage in less than 40 fathoms, till within half a cable's length of the shore.

The town or village is very pleasantly situated in a fine valley, between two high hills. A battery of five guns is placed joll round the W. point of the harbour, and commands the road; though it is possible to land clear of the reach of any gun. This battery is built of loose stones, piled up broad-high, and forming embraures, without mortar, or any kind of cement. On the left of the valley, on a little eminence, another battery was then constructing of masonry, with two faces, having 14 embraures in each, one face pointing to the anchorage, and the other flanking the village; five guns were mounted on that side which faces the road, and one in the other. According to the report of the commandant, the whole force on the island in January, 1793, consisted of six folders, and 40 of the fettlers armed and trained. Captain Mofs, though not allowed to refresh his crew, saw great numbers of goats on the sides of every hill, and regretted that he could not relieve his crew, who were disordered with the fevity, and which would have been speedily corrected by the fresh venison, fish, and vegetables to be found there. Towards the close of the year he touched again on the island, and was politely accommodated by the governor with a plentiful supply of sheep, vegetables, milk, and draw-fish, and two bullocks. In the town there are about 40 houses, and several in different parts of the island. Every house has a garden, with arbours of grape-vines, forming a delightful shade. Figs, cherries, plums, and almonds appeared all green, and abundance of potatoes, cabbage, onions, thyme, and other vegetables and herbs; but none of them in perfection, as a fort of ground is laid in a great measure to destroy the kitchen gardens. From other accounts it appears, that the southern part of the island is precipitous and barren; but there are some hills of a red-earth, approaching to vermilion. The soil of the northern part is loose and shallow, so that very large trees soon perish for want of root, and are easily overturned. The dreys of the women in this island is very singular: they wear a petticoat which reaches only a little below the knee, and which is spread out by a hoop at the bottom to a great distance round them, leaving the legs entirely exposed; they wear their hair long, plated into 40 or 50 small braids, which hang straight down the back. This dreys is also that of the ladies of Peru and Chili. In every house captain Mofs was presented by the women with mate, the infusion of the herb of Paraguay, which they suck up through a pipe or tube, that serves more than one person, and is handed about from one to another. The women are in general handbome, and every house swarmed with children. As Juan Fernandex and Mafauro may be mistaken one for the other, by strangers, both lying in the same latitude, we may observe, that the N. end of Juan Fernandez is highest, while Mafauro is lowest to the north. Besides, a small island lies off the S. end of Juan Fernandez. These two islands lie 50 miles from each other. Juan Fernandez, according to the observations of captain Mofs, lies in S. lat. 33° 40'. W. long. 80° 30'.

Fernando de Voronha, an island of the Atlantic, distant between 60 and 80 leagues from the coast of Brazil. Its surface is mountainous and unequal, but mostly covered with wood and herbage. The high part of one mountain, nearly in the middle of the island, is distingished from the rest; it is called "Campanario," or the Belfry, from its resemblance to a church tower, and it very much lean, or overhangs, to the edge. The island no where exceeds two leagues in extent.

According to Don Ulloa, to whose description of it captain Cook refers in the second volume of his second voyage, (p. 278,)
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(p. 273.), this island has two harbours, capable of receiving ships of the greatest burden; one on the N. side, and the other on the N. W. The former is, in every respect, the principal, both for shelter and capacity, and the goodness of its bottom, but both are exposed to the N. and W. winds, though these winds, particularly the north, are periodical, and of no long continuance. He further says, that you anchor in the north harbour, (called by Cook a road,) in 13 fathoms water, one-third of a league from shore, on a bottom of fine sand; the sea and hill above-mentioned bearing S. W. 3° fotherly. This road seems to be well sheltered from the S. and E. winds. The water in this island is brackish, and very scarce; and sometimes no rain falls for two or three years. In consequence of this deficiency of moisture, more than from the nature of the soil, which produces every species of grain, and fruits common in hot climates, the plants wither and die, and the most fertile parts of the island, unless when they are softened by the humidity of the clouds, become as arid and barren as rocks. The Portugueze, however, say, that in the interior parts of the island there is no want of water, that is clear and wholesome. In the interior part of the island there is a Portugueze town, in which the parish priest and governor reside; and it has several forts constructed of stone, which are spacious and well provided with artillery, and garrisoned by soldiers, who are partly regulars, sent from Fernando-Po, relieved every six months, and partly transports sent from that mart of Brazil, which supplies them with provisions and other necessaries. The harbour or roads abound with various kinds of fish, and from December to April the shores of the whole island are covered with the eggs of turtles. S. lat. 2° 53'.

W. long. 32° 34'.

FERNANDO-Po, or FERNAND PAR, an island of Africa, in the Atlantic, near the coast of Benin, about 20 leagues in circumference; the land lies high, and the soil is fertile in manioc, sugar-canes, rice, fruit, and tobacco; the inhabitants are rude and uncivilized. This island seems destitute of any good harbour, and very much abandoned to the goats and seals; but the Spaniards retain the nominal possession. N. lat. 3° 20'. E. long. 10° 45'.

FERNANDO, St. a town of South America, in the province of Tucuman; 150 miles W. of St. Jago d'Ellerias. S. lat. 28°. W. long. 69° 14'.-Allo, a town of South America, inthe province of Cumana.-Allo, a town of Spain, in Galicia, near the W. coast; 37 miles W. of Oviedo.

FERNAO, or FERNANDO VELOSO, a river of Africa, which runs into the Indian sea. S. lat. 14° 10'.

FERNEBO, a town of Sweden, in the province of Galicia; 25 miles S. of Galle.

FERNEL, John, in Biography, a physician of the sixteenth century, and a member of the faculty of Paris, greatly distinguished by his learning and talents. According to the belt authority, for there is some contradiction among his biographers, Fernel was born at Clermont, in the year 1497. He received the greater part of his education at a grammar-school of that place, under the eye of his parents; for it was not until the sixteenth year of his age that his ardent thirst after knowledge led him to procure the permission of his father to prosecute his studies in Paris. He distinguished himself so greatly among his fellow-students in philosophy, that after having taken the degree of master of arts, he was requested to undertake the professorship of Dialectics in his college (St. Barbe's). This led him to a serious and profound course of study, in order to the prosecution of which he renounced all locuty and recreation; and his labours were only rewarded by a gnatia 2920, with which he was feized, and which compelled him to fly to his native province for the restoration of his health. On his return to Paris, when he had determined to choose medicine for his profession, the narrowness of his father's finances compelled him to take some measures for subsistence during his study of that science; and he taught philosophy in the chair of the college of St. Barbe, and was admitted to the degree of bachelor in medicine (the duties of the professorship not impeding his studies) in 1526. In the year 1530, at the age of 33, he arrived at the doctorate, and settled in Paris. His passion for the mathematics, even after he married in 1532, had nearly proved ruinous to his family; when he listened to the advice of his father-in-law, and refined the study and practice of medicine, becoming at the same time a teacher of that science in the College des Comœudies in 1536. He soon obtained a most extensive fame, and a laborious practice, in which he was unceasingly successful, informing much that he had formerly time for his ordinary studies, and often took his meals without sitting. He was distinguished among his brethren by his boldness in returning to question the dogmas of Galen, in which the most eminent and bigoted confidence was universally placed. In 1542 he was put upon the establishment of the Dauphin, Henry, and was made personal physician to that prince soon after he came to the throne. He had hoped by this change of life to obtain leisure for the prosecution of his favourite studies; but the wars which Henry II. carried on with the English and Spaniards compelled him to remain at the head of his army, and Fernel followed him. But even amid the agitations of a military and repulsive life, at the age of sixty, Fernel seldom passed a day without writing. It was in one of these marches that he commenced his treatise on Fevers, which was indeed almost completed, when the king retired Castis from the English on the 17th of January, 1538. On his return from this expedition, Fernel followed the court to Fontainebleau, taking with him his wife, who, being hitherto accustomed to a quiet and stationary life, and chagrined at this separation from her family and connections, fell into a fever, in the course of a few days, which terminated fatally, on the 29th day of the diceast. The shock which this blow gave to Fernel was so great, that in twelve days afterwards, he was himself feized with a similar fever, which carried him off on the 26th of April, 1538, in the fifty-second year of his age, to the universal regret of the metropolis.

The following titles of the works of Fernelis, as he is called in his Latin treatises, are 1. "Monasphillanianum partibus confatis," &c. Paris, 1526. 2. "De Propositionibus, libri duos," ibid. 1528. 3. "Coffre-Athenienses Libros duos complexa," ibid. 1528. 4. "De naturali parte Medicinis libri septem," ibid. 1532. 5. "De vacuissimo ratione libri," ibid. 1545. 6. "De abditis rerum causis, libri duo," ibid. 1548. This work underwent nearly thirty subflection editions. 7. "Medicinae ad Hieronimi II. &c." 1554. This collection has been still more frequently reprinted, with some changes of the title. 8. "Therapeutes universales, seu medicinis ratione libri septem," Lugduni, 1659. 9. "Consiliun Medicinæm libri Arbor," Paris, 1582. Many times reprinted. 10. "Fibrum canarum medicinarum methodus generalis," Franconia, 1575. A posthumous work. 11. "De Louis venerea curatio perfectissima liber," Antwerp, 1579. Edited by Guikema, a physician of Bruges. Some other parts of his works have been translated, or edited separately since his death. Eley remarks, that as many things taken from the Arabian writers are found in the works of Fernel, and as the elegant Latinity in which he wrote,

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has repeated them is generally admired, the following homot has been applied to him: *Excess Arabum melius Latinitatis conditid.*


Gen. Ch. *Cal. PERIANTHUM superior, of four equal teeth. Cor. of one petal, funnel-shaped; tube the length of the calyx; limb fringed, in four equal broad segments. Stam. Filaments four, very short, inserted into the top of the tube; anthers erect, oblong, hollow, half as long as the limb, at length recurved. Pet. German inferior, globular; style thread-shaped, the length of the flower; stigma obtuse. Peric. Berry crowned with the calyx, of two cells, the partitions not reaching quite across, but their central part is (according to Jullien) supplied by a receptacle bearing the seeds. Seeds numerous.

Eff. Ch. *Corolla of one petal, funnel-shaped, superior. Anthers nearly sessile, in the mouth of the corolla. Berry of two cells, with many seeds.*

Obi. *This genus differs from Catechus in its short filaments and the place of their insertion. How far it is distinct from Ranitis, (now made a Gardenia,) except in number, which is of small or no importance, may admit of much doubt. Jullien gives their fruit to be similarly constructed.* We merely notice it here for future consideration.

Two species are described.

1. F. lanceolata. Lamarch, Encycl. v. 2. 432. Illust. 287. "Segments of the corolla obtuse. Berry globose." A much-branched shrub or tree, found in the island of Mauritius, where it is called *Bois de Buits,* or *Faux Buis,* Fass Box, from the resemblance of its leaves to common Box. It has no thorns. The flowers are whitish, axillary, two or three together, on short, simple, silky flanks, with a bell-shaped, toothed bract, like a second calyx to each. Corolla scarcely half an inch long. Berry the size of a black currant. Lamarch reckons two varieties; but those appear to us merely the same plant, gathered at two different seasons of the year, that in fruit having larger leaves.

2. F. olivacea. Lamarch, Illust. 287. t. 67. f. 1. "Segments of the corolla acute. Berry oval." Native of the same country, according to Lamarch, from whom alone we have any knowledge of this species. What he has associated with it in his plate, is an altered copy of *Petisia Liguliflorum* from Brown's *Jamaica,* t. 3:5; but has let this right in his letter-prepar.

**FERNERA,** in Geography, a town of Germany, in the principality of Culmbach; 12 miles S.W. of Culmbach.

**FERNES,** a cape, and also a bay on the W. coast of Edea, one of the Orkney Islands. N. lat. 59° 2'. W. long. 2° 43'.

**FERNY,** a small, regular, well built town, pleasantly situated near the lake of Geneva, with a handsome seat, celebrated for being the residence of Voltaire, at the intersection of two high ways, the one leading from Switzerland to Lyons, and the other from the Franche-Comte to Geneva.

**FERNITE,** a town of the duchy of Savoy; eight miles S.E. of Gratz.

**FERNS,** a small port town in the county of Wexford, Ireland, which is a bishop's see, united to Leighlin. For an account of the united bishoprics, see Leighlin. The bishop's residence is a handsome and convenient palace lately erected in Ferns. This town is 54 miles south from Dublin. Beaufort's Memoir.

**FEROE, or FAROE, Islands,** are situated in the North Sea, between N. lat. 61° 15' and 62° 21'; and with regard to longitude, the town of Thorshavn lies 19° 15' 15" W. from Copenhagen, and 9° 47' 45" E. from Tenerife. They are eighty-four miles distant from the coast of Norway on the eastern side, and forty-five miles from the Shetland isles towards the south-west. It is not improbable, that the free-booters, who at one time infested most of the northern seas, first discovered the way to these islands, where they introduced sheep, in order to supply them with provisions in their frequent cruises. In the time of Harald Harfager, king of Norway, that is, in the ninth century, these islands were inhabited by some discontented Norwegians, who for a long time supported themselves by piracy and occasional incursions into their original country, Norway. These people, it is reasonably supposed, were first subjected to the Norwegian dominion by king Hagen Adelheem, but they soon threw off the yoke, and maintained their freedom, till they were again reduced to obedience by king Magnus the Good; after which period these islands belonged to Norway, till they became a part of Denmark by the union of the two crowns. Christianity was introduced into these islands soon after its establishment in Denmark, A. D. 1007; and they were thought worthy of a particular bishop, who was appointed to reside in the island of Streome. The Norwegians are supposed to have given them the name of Feroe, from the number of sheep which they found in them; *far* in Danish signifies sheep, and an island; others, however, conceive, that the name is derived from *fer,* feathers, an article with which they were always abundantly supplied, or from *far,* or *fjor,* far distant. These islands are in number twenty-two, seventeen of which are inhabited. They occupy in a direction from N. to S. fifteen miles; extend in breadth from E. to W. ten miles; and contain altogether nearly 23 4 square miles. They consist of a group of steep hills or rocks, rising from the sea, chiefly of a conical form, and placed for the most part close to each other, none of which proceed with an even declivity to the shore; but the greater part of these declivities has two, or three, or more sloping terraces, formed by projecting rocks, and covered with a thin stratum of earth, which produces grass. Close to the sea, however, the land in general consists of perpendicular rocks, from two to three hundred fathoms in height. The highest of these hills is Shalinnin, in the southern part of Nordfornore, being two thousand two hundred and forty English feet high. The hills lie so close to each other, that they are separated merely by a brook or rivulet; and between them there are no valleys of any extent. In the higher ground, however, between their summits, are a few dales, covered with wretched grass. The rocks in general consist of trap, much intermixed with feldspar, glimmer and small grains of zeolites. No certain traces of any crater or signs of volcanic eruptions are found here; nor does there seem to be any pumice-flone or lava, unless basaltites, of which there are several columns, belongs to that kind of production. The Feroe islands contain a great many streams and rivulets, which are generally fordable and furnishing trout. Trout is also caught in some fresh water lakes between the hills. After rain these hills present a number of water-falls, the most remarkable of which is Fofia, between Qualvig and Haldersvig, in Nordfornore. These islands abound also in springs, which are of two kinds, cold and warm; of the latter, the most remarkable is Vernakilde in Oilarpe. The Feroe islands which are inhabited are seventeen, and form seven parishes; their names are

Fugle,
Fugloe, Swineo, Videiro, Bordo, Kinooe, Kalfoe, Otarve, Stromoe, Kolder, Hattoe, Nolfoe, Vaagee, Myggenes, Sandoe, Skuwe, the greater Dimon, and Suderoe. Bordo is separated by a narrow channel from Videiro, and is little more than 23 miles long, and at its greatest breadth 1 1/2 mile. It has seven villages. For the other islands, see their respective articles.

In these islands there is no want of good harbours and anchoring places; but there is some difficulty in obtaining pilots. The currents round and between the islands are rapid and strong, especially three days before and three days after new and full moons. There are several whirlpools at some distance from the shores. The turf which prevails round these islands is very remarkable, and in winter and the early part of spring it exhibits a wonderful and awful spectacle. As the Feroe islands lie in the latitude of 62° north, the sun, during the three summer months, is scarcely four hours beneath the horizon, so at that time there is no night; at least there is light sufficient for enabling a person to read and write. But in winter the days are so much shorter, and would be exceedingly dark, if the deficiency of light were not in some measure supplied by the morning and evening twilight. The heat, notwithstanding the high latitude, is more temperate in summer, and the cold less severe in winter than in the more southern provinces of Denmark; the sea round the coast never freezes; and the climate of this mildness of the winter is the vicinity of the sea. The weather in Feroe is never uniform, and the barometer is exceedingly variable. These islands have been under the imputation of being foggy and unhealthy; but though the first charge may be true, the second is not so well founded. The winds and hurricanes in the Feroe islands are so violent among the hills and rocks, as to inspire the traveller with terror. Thunder is not so common as in Denmark; but the northern lights are often seen, particularly in the winter.

Thee islands are at present almost entirely destitute of wood, but this does not appear to have been formerly the case. Attempts have been made at different times to introduce wood, by planting bushes and trees of various kinds, but they have been for the most part attended with little success. The black cattle here are small, and little or no trade is carried on in this article. The cows are much neglected and ill fed; and of course yield little milk. The Feroe heifers are small, with thick drooping heads; they are generally of a fox colour, and some few are almost black. Little attention is paid to them. Sheep, of which there is plenty, sometimes two or three hundred, are the principal riches of these islands; their flei affords them food; their wool clothing; and of the remainder, after their own wants are supplied, they manufacture articles of commerce. The sheep remain out summer and winter, without ever being housed; and on this account many of them are lost. Domestic cats are common, some of which become wild; and dogs are very useful to the peasants, as they affiliate them in the care of their sheep. It would extend this detail too much to enumerate the variety of their fowl and fish. Geese were formerly more abundant than they are now; but these islands have various kinds of ducks, the most remarkable of which, on account of its valuable production, is the eider duck. See Feroe.

One great source of subsistence to these islands is fish. A fowl which abound on the coast, and which are caught either by dragging them out of their holes, or by another method, for which a bird-pole, with a peculiar apparatus, is employed. The operation is regularly adventurous, and attended with danger, among the high and steep rocks, which the bird-takers climb, or from which they are supported by ropes. The catching of seals is also of great importance to the inhabitants of these islands. The fishery at Feroe, however, is much declined; at one time fish was an important article of food and of commerce; but these have now almost entirely deserted the coast. The kinds of fish caught in salt water are the torkil, halibut, and cod. The whale fishery is periodical, and does not now take place so often as formerly; but where it is carried on it produces great advantage to these islands. Small whales come to Feroe in flocks of from one hundred to one thousand; and when it is considered that each fish in general yields one cask of train oil, which falls for nine rix dollars, the value of one fishing will amount to from nine hundred to one thousand rix dollars, besides the benefit which the natives derive from the fish itself, which, if not employed for making oil, affords agreeable and wholesome food. See Whale-Fishery.

In Feroe there are no frogs, toads, lizards, snakes, or serpents, and no amphibious animal of any kind.

The natives of Feroe are, in general, handsome and well-made. In the colour of their hair there is considerable variety. Their complexion exhibits a healthful mixture of red and white, acquiring a brownish cast in hot summers, whilst they are employed in procuring turf. Their features are never disfigured by the small-pox, for this disease has not yet become endemic in these islands. The natives of the Southern islands, though their whole extent be only 15 miles, are of less stature, have round faces, speak precociously, and appear to be much livelier in their actions; whereas the natives of the Northern islands in general taller, have more lengthened countenances, speak flowier, and are much graver in their whole deportment. The women are, for the most part, exceedingly pretty and well-proportioned; many of the people are inclined to be phlegmatic; but they poise their great sensibility. They are of a religious disposition; and when, on a Sunday, they cannot have the benefit of a clergyman's services, they meet in church, sing psalms, hear the service read by one among themselves, and also a sermon. They are peaceable among themselves; affable and friendly in their disposition; and also, according to their means, hospitable, kind and benevolent. They are also kind in all their dealings with one another, and humane and compassionate towards strangers. The language of Feroe consists, in great part, of old Danish, or rather Norwegian words; which, by a corrupted pronunciation, has assumed a foreign appearance. However much of the inhabitants of these islands understand the Danish language, in which the Christian religion is taught. This account of the Feroe islands we have extracted from an anonymous writer who made copies extracts from the communications of a Danish clergyman who resided in them several years, and who had the best opportunity of acquiring himself with their situation, manners, and customs, as well as with their productions, and the manners and customs of the inhabitants.

PEROESIS, MARSIA, in Natural History, a race given by some authors, to marry with, found principally in the Pillars and coasts of Rhoen, and called by the generality of later naturalists, a curious mineral, and the basis by the ancients, terra, or terra fenestra. See Pericope.

PEROKABAD, in Georgia, a town of 11,000 inhabitants, on the coast of Othman; 13 miles N. of Castrum.

PEROM, a few port and good harbours, on the coast of the Rhoen Ocean, in the tropics; fast to the 70th parallel. 50 miles S.S.W. of Travullu, S. lat. 9° W. long.

flowers are unknown to botanists. The fruit is a compressed, roundish, rugged, bordered drupe, not very fleshy, with a compressed nut of two cells, with one seed in each, but it often happens that only one cell perfect its seed. The trunk is 40 or 50 feet high, bearing numerous branches at the top, the ultimate ones very slender. Leaves two inches long, alternate, on short stalks, elliptic-lanceolate, pointed, entire. Fruit in terminal bunches. The bark of the tree is smooth and ash-colored, milky when wounded. The heart of the wood is a kind of fattin wood, hard and heavy, red variegated with yellow, taking a fine polish. It is found growing in the woods called bois de Férodes, from a name of a former governor of Cayenne, who first introduced it as an article of commerce. Joffrin suspects this tree may be generically allied to the Pariniri of Aublet, t. 254-256. Petacryla of Schreber. They agree in the drupa of two cells, and are not dissimilar in habit.

**Ferulli**, in Geography, cape or point, a cape on the W. coast of Newfoundland, N. of St. John's bay. N. lat. 51°2' W. long. 74°52'.

**Feronia**, in Mythology, derived from fero, to bring relief, or from the town Feronia, near mount Soraceto, was, according to Servius, the patroness of the enfanchised slaves, to whom were prefixed many offerings; this goddess being in high veneration through all Italy. Servius supposes her to be the fame with the virgo Juno, and this supposition is confirmed by an ancient inscription quoted by Fabretti, and expressed in this terms: "Juno feronorum." The Romans appropriated to this goddess the care of the woods and orchards. She had a temple at the foot of mount Soraceto, where an annual sacrifice was offered to her; and it has been said that those who were fully inspired by this goddess walked bare-footed upon coals without being burnt, or suffering any harm. Hierocles in one of his passages (I. 1. fat. 5.) mentions the homage that was paid to this divinity, in walking the face and hands, according to custom, in the face of a mountain which flowed near her temple.


Gen. Ch Cal. Perianth inferior, of one leaf, small, flat, in five deep segments, deciduous. Cor. Petals five, oblong, acute, spreading, much longer than the calyx. Stamin. Filaments ten, inserted into the receptacle, awl-shaped, erect, shorter than the petals, broad and compressed, as well as very hairy, at the base: anthers erect, ovate. Phil. German superior, nearly ovate, style short, conical; stigma blunted, notched. Pfr. Berry of five cells, globular, with a tough roughish coat. Seeds very numerous, in simple rows, attached to the central receptacle.


The only known species is

F. elephantum. Roxb. Coromandel. v. 2. 21. t. 141. Elephant apple. A native of mott woods and mountainous parts of India, flowering, according to Dr. Roxburgh, during both the hot and cold seasons, and ripening fruit in hot and rainy weather. It forms a large tree, with a deeply cracked bark, from which, when wounded, issues a beautiful transparent gum, excellent for water-colours. The wood is white, hard and durable, but splits in the sun. Pulpy part of the fruit universally eaten by the inhabitants of the coast of Coromandel. The branches are thorny. Leaves pinnate, of about seven cleft, entire, smooth, opposite leaflets. Flowers in terminal and axillary clusters, white tinged with purple. Fruit the size of an orange, greenish. Some flowers have an abortive pilil.

**Ferosepoire**, in Geography, a town of Hindooftan, in Moultan, on the Setledge; 48 miles S. of Lahore. N. lat. 31°5'. E. long. 73°59'.

**Ferrácino, Bartholomew**, in Biography, was born at Baffano in Vicentin, in 1692, of parents too humble, that in early life he was engaged in fawing wood as the means of a livelihood. Having a natural genius for mechanics, he soon invented a fan to be worked by the wind, he rendered it so perfect, as to perform his work with expedition and accuracy, without much manual exertion. Success in one invention soon led him to make experiments in other branches of business, in which he likewise succeeded; he made clocks in iron; and invented some useful hydraulic machines; of these, one was formed on the principle of Archimedes' screw, which raises water to a considerable height. His chief work was the noble bridge over the river Brenta, at Baffano, which is greatly admired for boldness of conception, and solidity of construction. Ferracino died soon after he had completed this undertaking. His life was published in 1764, by M. P. Mem, in quarto, who has entered largely into his labours and inventions Now. Dict. Hist.

**Ferrand, Lewis**, was born at Toulon in 1645, where he received the elements of a learned education, but he finished his studies at Lyons. He was originally intended for the law, but he gave early proofs of attachment to Biblical literature and theology, by publishing, when he was but nineteen years of age, "A paraphrase on the fewest penitentiary Psalms." In the following year he went to Menevia, with a view of employing all his powers in a new translation of the Bible from the Hebr. His zeal being now checked by the want of encouragement, he returned to France, applied himself to the law, took his degrees at Orleans, and was admitted an advocate of the parliament of Paris. In 1670 he published a work, consisting of a plan of annals of the kings of France and the Ottoman emperors: in 1679 he published "Reflections on the Christian Religion, containing Explanations of the Prophecies of Jacob and Daniel relating to the advent of the Messiah," in two vols. abounding in much curious chronological and historical matter. For this work, on the account of his high merit, he obtained a pension of 800 livres. M. Ferrand died in 1699, having published many other works besides those which have been referred to, almost entirely on theology. The labour in which he was engaged was entitled "A Collection of Dissertations, &c. on the Bible, in the Latin language," only one volume of which was published during his life. He left behind him a great mass of MSS. on various topics of thee, one was committed to the press entitled "Of the knowledge of God." He was esteemed by his contemporaries a very able and very learned man; and he was unanimously most indefatigable in whatever he undertook. Morei.

**Ferrandus, surnamed Fulgentius**, who flourished in the 6th century, was an African by birth, and a disciple of St. Fulgentius. When that prelate was banished by the Arians to Sardinia, Ferrandus accompanied him; but on his return he was chosen deacon of the church of Carthage, when he entered with much zeal into the question which was the subject of warm discussion at that day, "whether it could be said that one of the persons of the Trinity suffered on the cross." Ferrandus died about the year 537, leaving behind him many works that were highly thought of by his contemporaries. The most considerable was "A Collection of Ecclesiastical Canons," for reforming discipline in the churches of Africa. This is one of the most ancient collections
collections of canons among the Latins. It consists of between two and three hundred abridged from the councils of Africa, Ancyra, Laodicea, Nect, Antioch, &c. A life of Fulgentius has also been ascribed to Ferrandus, but by some authors it has been ascribed to another of the prelate's pupils. Moreri.

FERRAR, Robert, was an eminent divine, born at Halifax, in the county of York, at which place he received the rudiments of his education; for its completion he was sent to Cambridge, and afterwards was admitted as a candidate into the university of Oxford. Having early embraced the doctrines of the Reformers, and in their defence displayed a considerable portion both of learning and zeal; he was patronized by archbishop Cranmer, who appointed him one of his chaplains, and subsequently procured for him the bishopric of St. David's. During the regency of Edward VI. he fell into disgrace at court, on fulmination of his entertaining heretical opinions, and was put in confinement on charges falsely preferred against him, as was subsequently proved; for in the reign of Mary he so far distinguished himself in the Protestant cause, as to excite the vengeance of the intantate persecutors of truth, bishop Gardiner; by whom Ferrar was immured to recant his errors, and, perfiling in his refusal to comply, was condemned as an heretic, and burnt at the stake in the town of Cambridge, South Wales; where an inhumed monument still records the magnanimity of that计量, and delineates the spot on which the pious prelate suffered martyrdom in the year 1555. Fox's Acts and Monuments.

FERRARA, in Geography, a city of Italy, and capital of the exarchate of the Lower Po, situated on a branch of the Po, on the frontiers of the Venetian states. Fortified by Sinagoras, exarch of Ravenna in 575, it was erected into a bishopric by pope Vitalian in the year 657, and in 735 it was made an archbishopric. It was afterwards enlarged, and became celebrated under the princes of the house of Este; but having lost its dukedom it declined in magnificence and wealth. It is about four miles in circumference, and defended by a citadel, strong walls, and bastions. The streets are handsome, and it has many magnificent palaces and churches. They reckon, besides the cathedral, which is ancient, 109 churches, 38 convents, and about 14,000 inhabitants. The air in its environs is unhealthy, owing to the account of the marshes that encompass it; Ariosto's buried in the Benedictine convent, and in the hospital of St. Ann Taio was confined as an idiot. Its university was founded in 1392 by Albert, marquis of Ferrara; 4 miles S.E. of Mantua. N. lat. 41° 51'. E. long. 13° 35'.

FERRARESE, late a province of Italy, in the state of the church, is bounded on the N. by the Po, on the E. by the gulf of Venice, on the S. by the Romagna and Bologna, and on the W. by the Mantuan and Modenese. The whole country is fertile, but low and marshy, being often overflowed by the waters of the Po. After passing from the house of Este, to which it was granted by the emperor Frederic II., to the state of the church, it now constitutes the department of the Lower Po, being ceded by the pope in 1797. It has few towns, being wholly cultivated, and thinly inhabited. The chief places are Ferrara and Comacchio.

FERRARI, John Matthew, in Biography, known by the surname of De Gradibus, or De Graudis, from the villa in which he was born, in the Milanese, was one of the most expert physicians of his time. He professed medicine at Milan, whence he was invited to Pavia, to occupy the medical chair in that university, an appointment which he fulfilled with great applause. He was also physician to Maria Bianchi Visconti, duchess of Milan. He died in 1480. He has left three large works, which have been frequently reprinted. The first is "A Commentary on rhases;" the second is entitled "Expositiones super vicesimam secundam Penit.," "Canonis Avicennae;' and the third also "A Collection of the Opinions of Avicenna, and Rabbi Moses."

FERRARI, Odonavio, was born at Milan in 1518, and having pursued a regular course of studies, he was made professor of moral philosophy and politics in the Casalbano college, a post which he occupied eighteen years. He was afterwards professor at Padua, or Pavia, but returned to Milan, where he died in 1586. He was intimate with the most eminent scholars of his time; and published an introduction to the Aristotelian philosophy, entitled "De efficientia Encyclicity," and another work, "De formibus Exotericher," which treats on the esoteric books of Aristotle. But his most valuable work in "De Origine Romanorum," devoted to the detection of the forgeries of Ausonius of Viterbo. He translated Athenaeus into Latin, and wrote notes upon Aristotle. Moreri.

FERRARI, Lewis, inventor of the first method of resolving biquadratic equations, was born at Bologna about the year 1520. He studied mathematics under the celebrated Cardan, who, having a problem given him for solution, gave it his pupil as an exercise of his ingenuity. This led to the discovery of a new method of analysis, which is precisely that of biquadratic equations. Cardan published this method, and assigned the invention to its real author, and, but for this liberal conduct of the master, the pupil, were not of publishing anything himself, would have been unknown to posterity. At the age of eighteen he was appointed a tutor in arithmetic, and was equal to the task of disputing with the most distinguished mathematicians of his own age. He was afterwards appointed professor of mathematics at Bologna, where he died in 1575. Ferrari was an excellent classical scholar, a good geographer, and well versed in the principles of architecture. He was, however, addicted to astrology. Hutton's Math. Dict. Moreri.

FERRARI, Francis Bernard, was born at Milan in 1577. He was educated in his native city, attracted the notice, and acquired the patronage of archbishop Borromeo, who, having projected a grand library at Milan, appointed Ferrari to travel through different parts of Europe to purchase the best books and MSS. that could be obtained. With this view he visited Spain and Italy, and procured a vast number of valuable works, which laid the foundation of the Ambrosian library. To this institution he was appointed the librarian, and created doctor. In 1638 he was nominated director of the college of Nobles, then recently erected at Padua, but the state of his health obliged him to resign that situation in less than two years. He returned to Milan, where he died in 1699, having attained to the ninety-second year of his age. He left behind him numerous works in ecclesiastical and profane antiquities in an unfinished state. His chief publications are, "De Antiquo Ecclesiasticorum Epistolae generis," lib. iii. Milan, 1613, 4to. "De Ritu Sacram. Eccl. Cathol. Conuenition." lib. iii. Milan, 1652, 4to. which was afterwards reprinted by Gravinus; and "De Ritu Veteranorum Acclamationibus et Plantis," lib. vii. this also is reprinted in the fifth volume of Gravins's Rom. Antq. Ferrari was author likewise of "A Treatise on the Furnace of Christians." Moreri.

FERRARI, Ottavio, was born at Milan in 1507, and to quickly did he establish his literary reputation, that at twenty years of age he was chosen professor of eloquence in the Ambrosian college. In 1684 he occupied the same post in the university of Padua, where he was also appointed professor.
professor of the Greek language, and by his means that fe-
mininity was restored to its ancient splendour. On account
of his extraordinary services he received a stipend of two
thousand florins; for a panegyric in praise of queen Chris-
tian he was rewarded with a golden collar, value one thou-
sand ducats, and another, published in honour of
Lewis XIV., obtained him a pension of 500 crowns for five
years. He was appointed historiographer to the city of
Milan, and compiled eight books of its history, but either
the want of necessary documents, or the fear of offending
the house of Austria, or his benefactor the king of France,
caufed him to leave his papers unfinished. He was well
known as an antiquary, and published several learned works
on that subject; there are "De re vellariis," to which he added
"Anatelas," and dissertations "De Lonicens Sepul-
chralibus veterum," "De Pantomimis et Mons," "De
Babrius et Gladiatore,". He died in 1634. Moreni.
FERRARI, JOHN BAPTIST, botanist of Sienna, deeply
learned in the Oriental languages, published, in 1622, a Syrac
dictionary, with a view of furnishing biblical scholars with
such Syriac words as occur in the scriptures. It is well and
highly spoken of by Simon and Labbe. He was author of
"Flora, feu de florum cultura;" alio of "Hesperides, fide
de Malorum Acerrorum cultura et us;"); He died in 1655.
Moreni. See FERRARIA.
FERRARI, PHILIP, was an Italian monk, who flourished
in the 17th century, and taught mathematics in the uni-
versity of Pavia. He recommended himself to the clemence
of several popes, as Clement VII., Paul V., and Urban VII.,
and was twice general, and twice vice-general of his order.
He was author of "Typographia in Martyrologium Ro-
nanorum," "Epitome Geograph. lib. iv.," but his principal
production was his "Lexicon Geographicum," which has been frequently reprinted. Moreni.
FERRARI, BENEDICTO, of Reggio in the Modenese
state, spent the chief part of his life at Venice, where,
though the inhabitants of that city cultivated, and encour-
gaged the drama with more diligence and zeal than any
other city in Europe, during the latter part of the 17th
century, and the beginning of the last, yet they were not
very early in its establishment; as the first regular opera or
drama fct to music which was performed at Venice after the
invention of recitative was "Andromeda," written by Ben-
detto Ferrari, and set to music by Francesco Minelli of Ti-
voli, in 1637. Ferrari was himself a celebrated performer on
the lute, an able poet, and a good musician; who, col-
lecting together a company of the best fingers in Italy,
brought this opera on the stage in the theatre of S. Caflano,
at his own expense, in a very sumptuous manner. An
e.xtraordinary influence of spirit and enterprise in a private in-
dividual of moderate fortune, to vie with princes in an ex-
bition of which they only could support the splendour.
(Le Glorie della Poet. et della Mus.) Ferrari was not only
qualified in an eminent degree for directing such enterprises,
but for supplying the principal materials; from his excellent
performance on the lute, he was very early styled by Ferrari
della Torba. He was a poet, a compiler, and a father in
his own drama. For five succeeding years, he annually pro-
duced an opera, which being collected into volumes in
1651, the printer informs the reader, that Benedetto had
still twelve more musical operas to give to the public. In
1638, "La Maga fulminata," by the same poet and musician,
was exhibited at the expense and risk of Ferrari and of five
or six of the performers, in a very sumptuous and mag-
ificent manner, though the expense did not amount to more
than 2000 crowns. A sum which, at present, (says the
author of "The Glory of Poetry and Music"
1730) is hardly
sufficient to satisfy the demands of an ordinary singer. But
at this time the performers either shared in the profits, or
were content with a moderate salary; public fingers being
then but seldom wanted, and that only in the capital cities
of Italy; whereas, at present, dramatic representations
abound in villages. Ferrari was author of both words and
music of two operas, "Armida," in 1639, and "Il Pastor
Reggio" in 1649; it was, however, much easier to set those
dramas than to write, as these operas preceded the invention
of airs, the dialogue being only carried on in recitative,
till about the year 1649, when, in the opera of "Giofone,"
written by Ciconi, and set by Cavalli, it is said that the
grace recitative began first to be interrupted by that ana-
crotic kind of liaue which has since been called aria.
Storia Crit. de' Teatri del Dottor Napoli Signorelli.
FERRARIA, in botany, so named by Burmann, in the
Epitome of the Imperial Academy of Natural Sciences
for 1761, in honour of John Baptist Ferrari, a Jesuit, who
published at Rome, in 1633, a quarto volume on the culture
of flowers, the pomposo plates of which are said to have been
drawn by Guido Reni and Pietro da Cortona. He pub-
lished also at Rome, in 1649, a full and splendid work, in
folio, on the culture of orange-trees. Linn. Gen. 165.
Gen. Ch. Col. Spatii of several inflated leaves.
Perianth none. Cor. of six petals, regular, cohering by their
claws, reflexed, pointed, crumpled, with involute points; the
three alternate ones rather the smallest. Stam. Filaments
three, united into a tube in their lower part, equal, spread-
ing above; anthers dilomatic, two-celled. Pet. German
inferior, obovate, obtuse, somewhat triangular; stipe thread-
shaped, the length of the flaments; rigmas three, dilated,
petal-like, cloven, deeply fringed, convexing. Peric. Cap-
ule oblong, triangular, of three cells and three valves;
partitions contrary to the valves. Seeds numerous, roundish,
in two rows.
Eff. Ch. Spatia inflated. Petals five, regular, crumpled
and fringed. Stigmas three, petal-like, fringed. Capsule
of three cells. Seeds roundish. This genus is very pro-
portioned by Mr. Gawler to the original species, and
another which he has described, excluding F. Pavia of
Limnaea, and isioria of Willdubon.
Jacq. Hort. Ind. t. 65; Curt. Mag. t. 144. (Fl. indicae)
ileiococcus fulvus, radice tuberose; Ferrar. de Pl. Cultura
168. t. 171.) "Border of the corolla three as long as
the claws. Lobes of the authors close." Native of the Cape
of Good Hope, cultivated by Miller at Chelfin in
1759. Art. Hort. Kew. v. 3. 305. It flowers with us early
in the spring, being kept in a greenhouse, like other Cape
bulbs. The laves are equitant, somewhat glaucous, inflat-
ed at the base, and the fmal leaves and spathe resemble them,
only being shorter. The flower is brachied above, bearing
numerous, very tenuous flowers, of a lingering and curved ap-
ppearance, variegated with purple and white, and bordered
with brown.
2. F. antherosa. Gaw. in Curt. Mag. t. 561. (F. vir-
dilora; Andr. Repop. t. 235. F. Ferrariola; Willd. Sp.
Pl. v. 3. 581. Mor. Ferrariola; Jacq. Coll. v. 4. 141.)
"Claws of the corolla equal to the border. Lobes of the
authors disarticulated." Native of the Cape of Good Hope,
introduced by Mr. G. Hibbert in 1820. It much resembles
the former, but differs essentially in the greater length of
the claws of the petals, the shape and greater size of the
antlers,
Ferrars, George, in Biography, was born at St. Albans about the year 1510. He studied at Oxford, and from thence he removed to Lincoln’s-inn, and became a distinguished pleader in Westminster-hall. He was patronized by lord Cromwell, and obtained the favour of Henry VIII. whom he attended in a military and civil capacity. In 1535 a considerable grant was made to him out of the royal demesnes in Hertfordshire, but, notwithstanding his ample income, want of economy brought his affairs into such a situation, that, in 1542, while reprentative for Plymouth, he was arrested for debt, and thrown into the compter. He was, however, set at liberty by virtue of privilege of parliament, and the officers concerned in his arrest were imprisoned for contempt of the powers and privileges of a representative of the people. In the reign of Edward he accompanied the protector, Somerset, to Scotland, as commissioneer of the army. He was afterwards master of the sports, at a festivity held at Greenwich for twelve days, in order to amuse the king. This appointment is supposed to have been occasioned by some mettalic flouris of his composition, intitled in the “Mirror of Magistrates,” the first edition of which appeared in 1559. Ferrars is laid to have been the author of “The History of the Reign of Queen Mary,” in the Chronicles published under the name of Richard Grafton. He published a translation of Magna Charta, from the French, into the Latin and English, and other laws enacted in the time of Henry III. and Edward I.


Ferrato Sasso, an historical painter known under that name, but whose real name was Giovanni Battista Salvi. He derived the former appellation from being born at an ancient castle so called, on the borders of the territory of Urbino, in 1504. He went to Rome to study the works of Raphael, then, as since, the admiration of the world. Francisco Penni assisted Salvi in his studies, who had obtained great skill in copying; but his original works do not exhibit much comprehension of mind. He died in 1590, at 86 years of age.

Ferrato, Cape, in Geography, a cape on the eait coast of Sardinia. N. lat. 39° 31’. E. long. 9° 34’.

Ferratt, Cape, or Cape Misjuff, a cape on the coast of Algiers. N. lat. 36° 9’.

Ferre, Cape, a cape on the S.E. coast of Martinico. N. lat. 14° 30’. W. long. 60° 30’.

Ferred-anah, a town of Africa, in the kingdom of Tunis, was formerly, according to Dr. Shaw, the largest city of Bizantium, though its ancient grandeur is exhibited only in a few granite and other pillars, which the Arabs have suffered to remain. It was well watered by a stream which ran under the walls, and by wells within the city, encompanied by a corridor, and vaulted over with cupolas. The circumjacent country, however, is dry, barren, and inhospitable, for want of water. Several circumstances lead us to conclude that it was the ancient Thala, mentioned by Tacitus, or Telepte; and that Thala and Telepte were the same; 15 miles S.W. of Tunis.

Ferrin on the Vocal Organs, in Music. See Voice.

Ferreira, in Geography, a town of Spain, in Granada: 18 miles S.E. of Granada.—Albo, a town of Portugal, in the province of Alentejo; 13 miles W. of Beja.

Ferreira des Aves, a town of Portugal, in the province of Beira; 15 miles N.E. of Viseu.

Ferreola, in Botany, from ferrum, iron, alluding to the hardness of the wood. Roxb. Corom. v. 1. 35.
Ferreti, Eximero, in Biography, born at Callèt-Franco, in Tuscany, in 1489, studied at Pisa and Sienna, and became secretary to cardinal Salviati at Rome. He was admitted an advocate at the age of nineteen; after which he was made professor of law, and secretary to Leo X. This office he filled with much reputation for several years, and then retired to his own country. On his return he accompanied Montferrat, the commander of the French army, to Rome and Naples. On his return he was taken prisoner by the Spaniards, and obliged to pay a high ransom for his liberty. He next went to France, and taught the law at Valence with great reputation. He was then employed in various diplomatic missions, and as councillor of the Parliament at Paris. At length, after various negotiations, he finally became protector of the law at Avignon, where his lapse was raised to a cardinal's crown. He died in 1552, and when his successor Crecenia began his lectures by fractures upon Ferreti, the scholars showed their attachment to their old master by hailing and driving him from the place. Ferreti was a man of general learning, and well acquainted with classical literature. He gave an edition of the principal orations of Cicero. Boyle. Moretii.

Ferreti, an historian and poet of Vicenza, was born about 1266, and took a considerable part in the restoration of polite literature in Italy. He wrote, in Latin, a history of Italian affairs, from 1250 to the year 1288. This is one of the best compositions of the age, and was first printed in Muratori's Collection of Italian writers. Moretii.

Ferretti, in Geography, a town of France, in the department of the Upper Rhine, and chief place of a canton in the district of Altkirch. The place contains 6,517 inhabitants, on a territory of 226,314 square miles, in 31 communes.

Ferretto, in the Glass Trade, a substance which serves to colour glass. This is made by a simple calcination of copper, but it serves for several colours. There are two ways of making this: the first is as follows: take this plates of copper and lay them on a layer of powdered brimstone, in the bottom of a crucible; over these lay more brimstone, and over that another layer of the plates, and so on alternately till the pot is full. Cover the pot, put it in a wind-furnace, and make a strong fire about it for two hours. When it is taken out and cooled, the copper will be found to calcined that it may be crumbled to pieces between the fingers like a friable earth; it will be of a reddish, and in some parts a blackish colour. This must be powdered and sifted fine for use. Neri's Art of Glass, p. 30.

The other way is less easy, but it makes a more valuable ferretto. It is this: make a number of stratifications of plates of copper and powdered vitriol alternately in a crucible, which place on the floor of the glass-furnace near the eye, and let it stand there three days; then take it out, and make a new stratification with more fresh vitriol, and calcine it again as before; repeat this operation six times, and a most valuable ferretto is produced.

Ferri, Paolo, in Biography, who flourished in the 17th century, was born at Metz in the year 1591. He pursued his theological studies with so much zeal that he was introduced to the ministerial office when he was but 19 years old, and even then he had appeared as an author by a volume of poems written in the moments of relaxation. He possessed very extraordinary pulpit talents, and was the most popular preacher among the reformed in his province. He died of the stone in 1669, in his 79th year. The works published during his life were chiefly theological, but he left behind him collections for a history of Metz, in three or four volumes folio, which are referred to by Calmet as abounding in curious researches. In the height of his popularity he was charged with having received an annual pension of five hundred crowns from cardinal Richelieu, as a bribe for his services in attempting to promote an union between the Catholic and Protestant religions. This charge has been fully investigated, and proved to be without the smallest foundation. Bayle. Moretii.

Ferri, il Cavalier Baltazar, of Perugia, in the 17th century, is inflamed by Roufseau, in his "Muf. Dict." as the most extraordinary vocal performer that ever existed. "This singular and prodigious finger," says he, "who had such talents as all the sovereigns in Europe courted and feized by turns, was loaded with gifts and honors during his whole life, and his powers and glory all the more extended with his life, and which lasted after his death. Every panegyric that was written upon this musician, breathes rapture and enthusiasm; and his contemporaries all unite in affirming, that a talent so perfect and so rare, was above all competition, and had even silenced Envy herself. It is impossible, say they, to express the brilliancy of his voice, or the graces of his style. He had all the characteristics of different styles in the highest perfection; he was lively, dignified, grave, and tender, at his pleasure, and all hearts were melted by his pathos. Among the infinite passages of the extremest difficulty which he performed with his voice I shall only repeat one. He ascended and descended in one breath two full octaves in a running stroke, in chromatic degrees of half notes with such accuracy, though without accompaniment, that, if suddenly the bafe was struck to any one of these intervals, whether flat or sharp, the exact intonation was instantly felt in an astonishing degree by the audience." Bontempi Iloria Muf.

We used to wonder whence Roufseau took this splendid account, as we found nothing so marvellous elsewhere; in Quadri's ample list of opera fingers, from the year 1734 to 1744, amounting to 273, no such name as that of Ferri occurs. We find him not in Padre Martin, Algarotti, Planelli, Napoleon Sgionelli, Artega, or Eximier, and it seems as if Bontempi, in imitation of Apelles the painter, who composed the face of his Venus of the best features of all the beauties of Greece, had rather told us what was to be wished in a perfect finger than what really ever did exist in any one mortal; and we cannot help thinking that Bontempi has coloured his piece the higher from Ferri having been his countryman. One great finger may have possessed two or three of his excellencies at milt. But exaggeration is the constant companion of panegyric and fatire. If a finger of the name of Baltazar Ferri ever saw the light, and had transcendent powers, they are certainly magnified à la Herfcheil: but his name not occurring in any other musical work, or dramatic perfonce of the innumerable operas that we have collated and examined, obliges us to doubt the authenticity of the account given us from Bontempi by the ingenious and enthusiastic citizen of Geneva.

Monf. Laborde has abridged the tale from Roufseau, and placed the name of Ferri in Quadrio's list, between Cavalli and
and Picta, among fitters who flourished between 1690, and 1700; but non efi inventus either there or elsewhere.

FERRI, Ciro, an historical painter, born at Rome in 1634. He was a favourite disciple of Pietro da Cortona, whom he assisted in finishing several of his works at Florence, and at Rome; and whose style he so nearly adopted that their pictures racy sometimes be mistaken for each other. Generally, Ferri has left grace of design, left care in his actions and draperies, and his comports of mind; but he has more fulness and carefulness of finish than his master. His St. Ambrose in the church of that saint at Rome offers the fairest comparison between them and Romanelli, a fellow scholar with Ciro Ferri. His principal works in fresco are in the Palace Pitti, at Florence, and at St. Maria Maggiore of Bergamo.

FERRIER, Jeremias, a Protestant minister, and professor of divinity at Niames in Languedoc, in the beginning of the 17th century, maintained in public debate that pope Clement VIII. was properly and truly Antichrist. For this liberty of speech he was arrested and thrown into prison at Toulouse; from the effects of which he escaped, in consequence of an arrest from Henry IV. forbidding persons to molest him on account of that business. Notwithstanding Ferrier's zeal in the issue referred to, he was one of the first who, in the political assemblies of the proprietors, opposed their proceedings in support of their civil and religious privileges and immunities. He began soon to be infested of having been induced by a bribe to desert his cause, and was forbidden to appear in their assemblies again. His conduct in other respects was equally reprehensible; and he was prohibited from exercising his ministry within the province of Languedoc. He now turned his attention to the law, but the populace, who are ever indignant at the treachery of public characters, attacked him publicly in the streets, with roses, and other missile weapons, so that his life was in imminent danger. Not contented with the injury inflicted on his person, they proceeded to ransack his house, burning and destroying his goods and books, and treating with much brutality his wife and children, whom the prudence of the magistrates preferred from greater mischief. Hence he became an avowed convert to the Catholic faith, settled at Paris, and took some pains to advance his fortune. His zeal was now equally great in defence of his new opinions, at least of what were considered his new opinions, and he published a treatise, entitled "De l'Antichrist et de les Marques contre le sainct et l'autre Catholique." He was likewise supposed to be the author of "Catholique écart, ou discours des Alliances du bon et tres Christien contre les colonnies des enemis de son etat." M. Ferrier was employed by the king in many affairs of great national importance, and was, in 1626, appointed privy counsellor. He stood also high in estimation with cardinal Richelieu. He died in 1626, and on his deathbed dictated an epitaph, in which he declared his hearty attachment to the Catholic faith; he went much farther, and even extorted from his children a promise that they would live and die in the communion of Rome. Bayle. Morel.

FERRIERES, in Geography, a town of France, in the department of the Ouan, and chief place of a canton, in the district of Juey; the place contains 689 and the canton 4,981 inhabitants, on a territory of 145 kilometres, in 16 communes. — Also, a town of France, in the department of Loiret, and chief place of a canton, in the district of Montereau; the place contains 1,610, and the canton 9,625 inhabitants, on a territory of 275 kilometres, in 7 communes. Vol. XIV.

FERRILITE, in Mineralogy, a name given by Mr. Kirwan to rocks found at, and in the neighbourhood of Rowley Regis, Staffordshire, and known by the term Rowley flag. It has been considered by many as habit, by others as Floetz greenstone, and by some called win, an indefinite term used in the north of England, and applied to various hard stones.

Its colour is greyish-black, inclining to greenish-black, and, when exposed to the weather, brownish. It occurs massive in great beds, or strata, in the vicinity of Rowley, Didley, Walfall, and the south-west part of Staffordshire; and in some instance in uncommon distinct concretions, particularly at Pockhill, near Walfall, where it is quarried for mending the roads.

Internally it is glistening, from minute crystals of hornblende and felspar, particularly the fractured surface of the latter, which is foliated.

The fracture is generally fine-grained, uneven, but often flat, conchoideal, and fine splintery. The fragments rather sharp edged.

When disintegration has taken place to a considerable extent, it occurs in large globular concretions, which appear to be composed of concentric laminations.

It is generally opaque, but sometimes faintly translucent at the edges, gives a whitish grey streak, hardish, feretates glists, brittle, and difficultly fusible, but less so than basalt of Werner; specific gravity 2.7 to 2.9.

It melts easily, without addition, before the blow-pipe, into a black glass.

It consists of felspar and hornblende in a confusedly crystallized state; it has been analysed by Dr. Withering, with the following result:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica</td>
<td>47.5</td>
</tr>
<tr>
<td>Alumina</td>
<td>31.5</td>
</tr>
<tr>
<td>Oxid of Iron</td>
<td>21.0</td>
</tr>
</tbody>
</table>

It is probable, as so great a portion of it consists of felspar, that it contains potash, but which, at the same time when this analysis was made, was not suspected to occur in the mineral kingdom.

It is also probable that the iron it contains is in a low degree of oxidation, as it exerts so much influence on the magnetic needle. This effect has been long known, as Dr. Patt, in his "History of Staffordshire," mentions, that he drew the compass needle 6" out of its proper direction.

The lower stratums of the Derbyshire coal-flags, which very accurately resembles ferrilite, in its external character, is also very magnetic.

Mr. Kueir has, in Shaw's "History of Staffordshire," given an interesting account of this ferrilite, and lately Mr. G. Watt (in Philos. Trans. 1804), has given a still more interesting detail of experiments made on this SUBSTANCE, by melting, and cooling it with different degrees of rapidity.

When cooled suddenly from the fluid state, it assumed the appearance of an opake black glass, but when the heat was so slowly withdrawn that it was several days in cooling, its appearance was as fomy, and texture as crystalline, as the original rock.

For observations on the phenomena, and conclusions illustrative of the igneous formation of basalt, and other rocks, see Philos. Trans. 1814.

FERRITER'S ISLAND, in Geography. See Blaes.
FERRO, or Hiero, the most westerly of the Canary islands, about 15 miles in breadth, and 45 in circumference. The ascent from the sea is difficult, as it is on all sides high and craggy; but on the summit it is tolerably level and fruitful; abounding with many kinds of trees and shrubs. It produces better grapes, herbs and flowers than any of the other islands; so that bees thrive and multiply here exceedingly, and yield excellent honey. The greater part of the wine of Ferro, which is bad, is distilled into brandy; and there are only three fountains of water on the island. On account of the scarcity of water, sheep, goats, and swine do not drink in summer; but they are accustomed to dig up the roots of fern, and chew them in order to quench their thirst. The larger cattle are watered at those fountains, and at a place where water drifts from the leaves of a tree. The English and French geographers formerly reckoned their longitude from Ferro; but Englishmen now count their longitude from Greenwich, and the Frenchmen reckon theirs from Paris. N. lat. 27° 45'. W. long. 17° 46'.

Ferdogan or Feradon, a mountain of Scotland, in Perthsire; 18 miles S. of Blair Athol. Its height is estimated at 2548 feet above the level of the sea.

Ferro, a handlime; ferry-port of Spain, and harbour for the royal navy, in the province of Galicia, the entrance of which is formed by Cape Prior. It is situated N.N.E. of Corunna, and ten Spanish leagues from Cabo Ortegal, and has been, since the middle of the eighteenth century, one of the most famous maritime places in Europe, and one of the best in Spain. Before the year 1752, Ferro was merely a kind of hamlet, inhabited by the sailors of coaling vessels, and fishermen; but a town has since been raised with an increasing population. The harbour is very safe, being on every side protected from the winds; it is surrounded by redoubts, mounting five cannon on each front, and four on each side; the whole is connected by an intrenchment and a parapet, which mask the interior works. It has one parth, containing about 5600 entitled inhabitants, and occasionally many more, who are attached to the navy and the harbour; and it has two hospitals, one for the inhabitants, and the other for soldiers and sailors. It has also a school for midshipmen, magnificently built; the handloom arbal in the kingdom; a machine for hammering copper to the height vessels; and an extensive rope-walk. The naval barracks are large and commodious, and capable of containing 5600 men. Here is also a good dock-yard. This place is at present the first arsenal of the royal navy of Spain: it was erected by order of Ferdinand VI., the father of Charles III. Art and nature have combined to render the position of the harbour impregnable. The basin for the fleet is immense; each ship having a separate warehouse, where the tackle, rigging, and spare stores are marked, and placed in the greatest order. The "prefidario" is composed of 600 galley slaves, who are employed in the most laborious works of the harbour. Two caisles, that of St. Philip, and that of the Palms, defend the approach of the coast from Corunna and Ferro, and the roads between them. Ferro being more a military than a civil place, has only an alcalde mayor, and some alcaldes of districts, to attend to the police of the town; but it has a military commandant, a governor, an attendant, a complete and numerous staff, who serve for the fortifications, the harbour, and the garrison, which is always very strong. As Ferro is altogether intended for the royal navy, general commerce and all foreign merchant-ships are excluded, except such coaling vessels, &c. as supply articles of necessaries. The environs of the town have many fountains of excellent water, and the town has abundance of river and sea fish. It has only one manufactury, which furnishes sail-cloth. N. lat. 43° 21'. W. long. 8° 11'.

Ferro, a small island in the Pacific ocean, near the coast of Peru. S. lat. 9° 15'.

Ferruginous, denotes a thing to vartake of the nature of iron, or to contain particles of that metal. It is particularly applied to certain mineral springs, whose water, in their passage along the strata of the earth, meets with the ore of this metal, or with pyrites containing it, part of which they waft off, and carry with them, and thus become impregnated with the principles thereof. Such are what we call chalybeate waters.

The waters of Tumbridge, those of Forges, and of the iron spring at Bourges, and many others, are ferruginous.

Ferrugo, the rust of iron, or a kind of calx found on the surface thereof. The rust of iron is a refringent; applied by way of paper, it represses the flour ulcers; and drink, prevents conception; it cures the erysipelas, and exanthematous eruptions. It is of good use in a paronychia, roughness of the eyelids, and a coulodyma. It also strengthens the gums, relieves under the gout, being rubbed on the part affected, and makes the hair grow after an abscission. Wise on water, in which red hot iron has been quenched, being drank, is good for the colicin passions, dysesthesia, disorders of the spleen, cholera morbus, and relaxations of the bowels. See Iron.

Ferrule, in a Sb, a small iron hoop, fixed on the extremities of the yards, booms, &c.

Ferrum. See Iron.

Ferrum Equisinum, in Botany, Horse-shoe Vetch. See Hippocris.

Ferry, a liberty by prescription, or the king's grant to have a boat for passage upon a river, for the carriage of horses and men for a reasonable toll: it is usually to cross a large river. Termes de Ley.

A ferry is no more than a common highway; and no action will lie for one's being disturbed in his passage, unless he allege some particular damage, &c. (3 Mod. Rep. 294.) The not keeping up of a ferry has been held to be inoffensible. If a ferry be granted at this day, he that accepts such grant is bound to keep a boat for the public good. Holt, Ch. J. Shaw. 257.

Ferryland Harbour, in Geography, a bay on the east coast of Newfoundland. N. lat. 47° 5'. W. long. 52° 51'.

Fersin, a town of Perie, in the province of Irak; 22 miles S. of Sava.

Fersina, a river of Tyrol, which rises in a lake near St. Boldo, and runs into the Adige. 2 miles N. of Trent.

Ferte-Allais, La, a town of France, in the department of the Seine and Oise, and chief place of a canton in the district of Etampes. The place contains 786, and the canton 8,583 inhabitants, on a territory of 1673 kilometres, in 18 communes.

Ferte-Bernard, La, a town of France, in the department of the Sarthe, and chief place of a canton in the district of Mimers, surrounded with walls, and containing three fairsbours, 21 miles N.E. of Le Mans. N. lat. 48° 11'. E. long. 0° 44'. The place contains 2314, and the canton 11,720 inhabitants, on a territory of 1814 kilometres, in 14 communes. This is the birth-place of Robert Garnier, a poet.

Ferte-Chaandons, Le, a town of France, in the department of the Nièvre; 12 miles N.W. of Moulins.

Ferte-Fresnay, Le, a town of France, in the department
FERTILE, fruitfulness, that quality which denomina-
tes a thing fertile or prolific.
FEKULA, a little wooden pallet or slice, reputed the
schoolmaster's sceptre wherewith he chastises the boys by
linking them on the palm of the hand.

The word is Latin, and has also been used to denote
the prelate's crozier and staff. It is supposed to be formed of
the Latin, feris, to strike; or, perhaps, ferula in this sense
may be derived from the name of a plant, called, in Latin,
ferula; in English, fennel-staff; the item wherein was an-
ciently used to correct children with.

Under the eastern empire the ferula was the emperor's
crozier, as seen on divers medals; it consisted of a long flem
or shank, and a flat square head. The use of the ferula
is very ancient among the Greeks, who used to call their
princes ἀναγόμαι, q. d. ferula-drawers.

In the ancient eastern church, ferula or nardus signified a
place separated from the church; wherein the penitents or
the catechumens of the second order, called αὐγολογοι,
μερισματος, were kept, as not being allowed to enter
the church; whence the name of the place, the penions therein
being under penance or discipline: sub ferula erant eccles.

FERULA, in Botany, a name in Pliny, derived by some
from feriо, to carry, because its light hollow stalks were carried
in the hand, as walking-sticks; by others from ferio, to strike,
because they were used to chastise school-boys. Fennel-giant.

Gen. Ch. General umbel of numerous rays, globoso;
partial similar to it. General involucrum deciduous; partial
of numerous, small, linear leaves. Perianth scarcely discern-
cible. Cor. Universal uniform; flowers all fertile; partial
of five oblong, straightish, nearly equal petals. Stam.
filaments five, the length of the corolla; anthers simple.
Pist. Genuin inferior, tuberine; stigmas two, reflexed;
stigmas obtuse. Peric. Fruit oval, somewhat compressed,
marked with three elevated lines on each side, separable
into two parts. Seeds two, very large, elliptical, flat on
each side, marked with three distinct ribs.

Eff. Ch. Fruit oval, compressed, with three ribs on
each side. Calyx obdose. General involucrum deciduous.
Flowers uniform, all fertile.

Olf. The stalk of the principal umbel sometimes
throws out lateral opposite flower-stalks.

The inflorescence of umbelliferous plants, whose stems, though
annual, and consequently properly herbaceous, have, when
dry, a woody hardnesh; hence a quilling ancient is report-
ed to have called Ferula wood and no wood. The specious
in Wildenow are 12, but the synonyms are not free from
confusion. The leaves of all are extremely compound,
with narrow, nearly linear, leaflets or segments, often
fining. The flowers are generally copious, yellow, dis-
pelled in a corymbose manner on a round, upright, tall,
hollow stem. The plants when wounded exude an acrid or
fertid resin.—They generally grow in the south and east of
Europe.—The chief species are,

Na. Sc. of Dioecordes. "Luciffs linear, very long and
simple." This was formerly supposed to yield the gum
called Sagoferia, but modern naturalists have thought
otherwise. It is fearfully cultivated but in curious botanic
gardens.
FER

gardens, on account of its cumbersome size and weed-like aspect. It is common in fields about Rome, flowering about Midsummer.


F. Asf-furtida. Linn. Mat. Med. 40. (Asf. furtida; Kempt. Am. Exot. 555. t. 556. "Leafless alternately flatted, acuti. Native of Furtida, the flowering of which is brought to us. (See Furtida.) We know nothing of this plant but from Kempter's account and figure, from whence the above character is taken.

F. perfeta. Wildl. 1415. (Asf. furtida; Hope Tr. of R. Soc. for 1785, 36. t. 3, 4. "Leaflets many-crested, acute, decurrent. Primary unfollic.'—The seeds of this plant were sent from the mountains of Ghilan in Persia to the Peterborough Society, and two roots were committed to Dr. Hope at Edinburgh; whence Chelsea and other gardens have obtained living specimens. The leaves do not accord with Kempter's figure above quoted, and, therefore this is supposed a distinct species from the last, yielding, nevertheless, genuine Asf-furtida, with the flavour of which every part is strongly impregnated, and which exudes in the form of a milky fluid wherever the herb is wounded. The flowers are rather glaucous. Flowers deep yellow. It is perennial and hardy with us.

The fritillaries in the Levant make use of the seeds to transport fire from one island to another. This custom is of the earliest antiquity, and goes far to explain the warlike in Furtida (Op. et Die. t. 5. v. 5.) who, speaking of the fire stolen from heaven by Prometheus, says, that he carried it in a furtula, & corona regina, since the foundation of this fable is undoubtedly owing to what Diodorus Siculus (1. 3.) tells us of Prometheus, that he was the inventor of the seal, or tauros, with which fire is thrown from the flint. It is probable that prince made use of the pitch of the furtula instead of tinder, and taught men to preserve fire in the flake of that plant. Its flake is strong enough to serve for a support, but is too light to wound those who are beat with them. Hence we are told by Diodorus Siculus (abi supra) that Bacchus, one of the greatest legislators of antiquity, enjoined primitive mortals, when they drank wine, to use these furtula cases, because they frequently broke one another's heads with those they used to wear of another kind.

Ferula, in Gardening, comprises plants of the herbaceous, perennial, flowery kind. The species chiefly cultivated being the common fennel giant (F. communis); the glucorum fennel giant (F. glauca); the Tangier fennel giant (F. Tuquetiana); and the broad-leaved fennel giant (F. ferulago). They are all plants which rife to a great height in fudy soils as fuit them.

Method of Culture.—All these plants are capable of being readily propagated by fowing the seeds either in the autumnal or spring fenon, in drills on beds of light earth, at one foot apart, and three inches distant. As the plants advance in growth they must be kept properly clean from weeds, and be well thinned out in order to afford full room for their spreading out.

They should continue in these beds for about two years, when they may be carefully taken up in the beginning of

the autumn, and be planted out where they are to remain. They mostly succeed in the bell manner in the rather moist mellow loamy soils.

They are rather hardy, and well suited for being planted for ornament, in the more extensive borders and clumps of pleasure grounds, where they often continue for several years without requiring any other attention than that of being kept clean from weeds.

Ferula, in the Materia Medica. See Asa-furtida. Ferula, a word used by the ancients to express the horns growing on the deer or stag at the age of two years.

Ferula, among Sages, called also splinters, are little chards of different matter; as of wood, bark, leather, paper, &c. applied to bones that have been disjoined when they are set again.

The bark of the herb fennel-giant, called by some, in Latin, ferula, was anciently much used on this occasion; whence the name ferula became common to all.

FERUS, John, in Biography, who flourished in the 16th century, was a native of Metz, where he took the habit of the Franciscans, and became warden of the order. He preached many years with great reputation, and died in the year 1554. His great work as an author was entitled "Commentaries" on almost all the books of the Old and New Testament. These are characterized by Dupin as large and eloquent discourses, in which the holy scriptures are faithfully explained. He was a candid as well as learned expositor, so that his writings have been in high estimation with Protestants, as well as by the liberal of his own denomination. The author had nearly suffered for his boldness in defence of a friend, and the works of Ferus were infected in the "Index Expurgatoriis." Like many good and excellent men of all persuasions he denied the lawfulness of war, holding it to be repugnant to the distinguishing principle of Christianity, which is universal benevolence. Moreci.

FERZA, in Natural History, a name given by the Persians to that gem which we call the turquoise or Turquoise-flone, a blue, opaque, and fault gem. See Turcois.

FESCAMP, in Geography. See Fescamp.

FESCANNINE, in Antiquity. Fescanneine veres were a kind of satirical verses, full of wanton and obscene expressions, sung or recited by the company, with many indecent gestures and dances, at the solemnization of a marriage among the Romans, and also at the festival of "Harwell-home." Hor, ep. 1. lth. v. 147.

The word is borrowed, according to Macrobius, from fascinum, a charm; the people taking such fongs to be proper to drive away witches, or prevent their effect; but its more probable origin is from Fescanninum, a city of Campania, where such verses were first used.

FESIN, in Geography, a town of Egypt; 18 miles N. of Abu-Girégé.

FESOLI, or Fiesoli, Congregation of. See Jeronymites.

Fesse, in Heraldry, one of the nine honourable ordinaries of the escutcheon, which it divides horizontally in the middle, and separates the chief from the point. It is supposed to represent a broad girdle or belt of honour, such as those with which knights at arms were anciently girded. It polishes the centre of the escutcheon, and contains in breadth
breadth one third part thereof. Thus, he beareth azure, a felle, or, by the name of Elliot.

When the felle takes up less than its proper breadth, it is called a bar.

**Fesse-point** is the exact centre of the ecuelleton.

It is thus called, as being the point through which the felle line is drawn from the two fides; and accordingly it divides the ecuelleton into two equal parts when the ecuelleton is parted per felle.

**Fesse-ways, or in Fesse,** denotes things borne after the manner of a felle; i.e. in a line or range, across the middle of the shield, which the French call en fesse.

**Fesse, party per,** implies parted across the middle of the shield, from side to side, through the fesse point.

This the French express by one word, couped.

**Fesseldorf,** in Geography, a town of Germany, in the bishopric of Bamberg; four miles S. W. of Weißenfayn.

**Fessier,** in Anatomy, the name given by the French to the glutae muscles, which are distinguished as the grand, moyen, and petit. It is derived from fesse, the buttock.

**Festal, Constantius,** in Biography. Besides the works of such musicians as may be classed under the several schools of Italy, there are extant many admirable productions of a much higher period than Palestrina, preferred in the collections of the curious, by Italian composers, the particular place of whose birth or residence has not been recorded. Among these, there is one who for his genius and abilities well deserves a niche in every history of music. This is Constantius Fellsa, of whose compositions there are several in the British museum. There is likewise a motet of this ancient master in the same collection, printed in the fourth book of the "Motetti della Corona," which was printed so early as 1519, ten years before Palestrina was born.

In the third book of Arcadelt's madrigals, printed at Venice, 1541, there are also seven compositions by Collanza Fella, in which more rhythm, grace, and facility appear, than in any production of his contemporaries, that we have seen. Indeed, he seems to have been the most able contrapuntist of Italy during this early period; and if Palestrina and Constantius Porta be excepted, of any period, anterior to that of Carissimi. His motets, for three voices, printed in 1543, are in the church style of the times, a model of elegance, simplicity, and pure harmony; the subjects of imitation are as modern, and the parts sing as well, as if it was a production of the present century. We could not resist the pleasure of scorning his whole first book of three-part madrigals, from the second edition printed at Venice, 1550; for we were astonished as well as delighted to find compositions to much more clear, regular, phrased, and unembarrassed than we expected.

**Festa in Capitis,** in Middle Age Writers, grand holidays, in which the whole choir of the cathedrals were cape.

**Festenberg,** in Geography, a town of Silefia, in the province of Ols.; 10 miles N. of Oels. N. lat. 51° 21'. E. long. 17° 30'.

**Festi Dies,** among the ancients, were feast-days or holidays. Numa distinguished the days of the year into felli, profelli, and intercali. The first were those dedicated to the gods; the second were those allowed to men for the management of their own affairs; the third were shared between the gods and men.

The felli days, again, were divided, according to Macrobius, Saturn, cap. 10. into sacrificia; epules, or banquets; ludii, or games; and seria; and the profelli into sacra, consilia, comprehending flatus, praebites.

**Festing,** Michael Christian, in Biography, an eminent musician, whose instrument was the violin, and who, during many years, was the leader and principal conductor of almost every musical establishment in London.

This performer, with a noble head, little genius for composition, and not a deep contrapuntist, by good feme, probrity, prudent conduct, and a gentleman-like behaviour, acquired a weight and influence in his profession, at which hardly any musician of his class ever arrived. He led during many years at the opera, at Ranelagh, at the concert at Hickford's room, at the Swan and Castle concerts in the city, and often at Handel's oratories. Nor was there a benefit concert for any English professor at that time without a solo on the violin by Mr. M. C. Feiting; and yet there is not a ripieno player on the violin at the opera now, whose hand and abilities are not superior to those of Feiting upon that instrument. Learn hence, ye young professors, that something else is necessary, besides musical talents, to carry you reputedly and comfortably through the world.

**Festing-Men.** See FESTIVALS.

**Festing-Penny,** in Rural Economy, a term provincially applied to the earned given to servants when hired at fairs, or other places.

**Festino,** in Logic, one of the moods of the second figure of syllogisms.

In a syllogism in syllogino, the first proposition is an universal negative; the second, a particular affirmative; and the third a particular negative.

**Festival.** See FESTIVAL and FESTUN.

**Festonersgroat,** in Geography, a town of Germany, in the bishopric of Bamberg; 16 miles S. W. of Bamberg.

**Festoam,** in a General State. See GARLAND.

**Festoon,** in Architecture and Sculpture, is a decoration in form of a garland or cluster of flowers.

The word is French, fêson, which signifies a garland, formed of the Latin, festum, feast.

It consists of a drap or collar of flowers, fruits, and leaves, tied together, somewhat bigger in the middle, and fuppedead by the two extremes; from which, beside the main part which falls down in an arch, two lesser parts hang perpendicularly.

This ornament is made in imitation of the festoons or long chissers of flowers, hung by the ancients on the doors of their temples, &c. on festival occasions.

Festoons are now chiefly used in friezes, tablets, and other vacant places, required to be filled up and adorned, They are sometimes used over or under a niche.


Gen. Ch. Cal. Glume of two valves, ereti, containing many florets, in a flender, roundish, two-ranked spikelet; its valves awl-shaped, pointed, the lower one divided in to two valves; the lower one large, of the form of the calyx but larger, somewhat cylindrical, pointed, awned. "Neclary other of two ovato-lanceolate, acute leaves, gibbous at their base; or of one rather concave, horizontal, notched leaf." Schreb. Stam. Filaments three, capillary, the tee...
shorter than the corolla; anthers oblong. P. f. Germain turbinata; styles two, short, reflexed; stigma downy, Pariet. none, except the corolla closely enclosing, and united to, the feed, not burling. See one, oblong, flender, very sharp at each end, marked with a longitudinal furrow.

Eff. Ch. Calyx of two valves, Spiklet oblong, some-what cylindrical, two-ranked, with sharp-pointed glumes.

A rather large genus, of flender, narrow-leaved, rigid grasse, of a glaucous or greyish-green hue, whose species are often very difficult to define. Some diversity of opinion has existeiled among botanists respecting the generic distillation between Actinida and Browni. (See Browni.) The terminal awn of the former is generally conflant, to which Dr. Smith has added the smoothness, or at least only fine pubescence, of the edge of the inner valve of the corolla; considering the moiit important mark of Browni to confit in the strong bristle fringe of the fame part. With this last character will always be found the proper habit, colour and proportion of the latter genus, whether the aewn be accurately described.

Willdenow has 26 species of Actinida, but many more are now known. Of these 26, 15 have the panicle pointing to one side; the reft have an equally spreading panicle.

The Flora Britannica describes 12 species, to which two have since been added in Engl. Bot. v. E. escul., t. 1917, a glaucous kind found on barren open heaths in Surer and Suffolk; and F. triflora, t. 1918, found by Mr. Crowe at Saham, Norfolk, and since by the Rev. Mr. Holme, F. L. S. at Hinton, Cambridgeshire, and by Mr. G. Don in Scotland. This is Browni triflora of Linnaeus, very near F. gigantea, t. 1820, and like that, approaching too much to the habit of a Browni, but both of them have the two midst effential characters of Actinida.

F. escula. Engl. Bot. t. 585, common in dry open ground, has been much celebrated by Stillingskeet as good for feep, but some late observations have dired the opinion, it being doubtful whether those animals eat it, though it grows where they feed. From this F. escula, t. 1555, was first separated, as a species, in Fl. Brit. having been brought a variety, caufed by its mode of place of growth. But its glumes are very differently shaped from thoife of F. escula. There is more doubt whether anemophilina be really diffini from escula, and also whether rubra, t. 2056, and all its acknowledged varieties, be specifically different from durifcula, t. 470, and dumortier of Linnaeus and Willdenow. On all these subjects expertiments and repeated obervations are wanting. Soil and situation cause great differences in the extent of the creeping roots, and the downiness, as well as size, of various parts. Some of our British species are trierly worth the annuals, as brennise, Engl. Bot. t. 1411, myuros, t. 1412, and uniglumis, t. 1437, the latter remarkable for having more or one valve to the calyx, the other being, as it were, abortive. Others are valuable perennial meadow grasses, as pratensis, t. 1592, and elato, t. 1593.

Of the foreign species, F. pomila of Villars and Willdenow, much better named varius by Jacquin, has an elegantly party-coloured panicle, and is frequent in Switzerland, and other alpine countries in the southern parts of Europe. F. spica is famous in botanic glory as being the long-dubious Anthocyanum paniculatum of Linnaeus, or Nardus spica nardinae of Baunin, and the Poa Gerardii of Allioni. See Trans. of Linn. Soc. v. 1. 111, t. 19, and v. 2. 101. This is a tall handsome perennial grass, with a dense bronze-coloured panicle, and purple anthers. F. fusca, a native of the Levant, has long creeping roots, with very

woolly fibres, formed, like rubra, to bind loose sandy soils. Its brownish panicle approaches in beauty to Poa fragilis. F. indica, copied by Willdenow from Retzii, is the very same plant as fusca.

F. spin fa, Linn. Suppl. 111, a native of the Cape of Good Hope and the Canaries, is a wonderfully rigid, spinous, widely-creeping species, so doubt formed to grow in the moist and sand. This is referred by Willdenow to Poa, see his No. 41, perhaps not amis, but then F. fusca will go near to be a Poa allo, notwithstanding its awns.

F. flavens of Linnaeus and Willdenow is removed by Scopoli and others to Poa. F. decumens is also made a Poa in Fl. Brit., but it is more naturally perhaps, as Haller thought it, a Melica. Thus even the above hit in Willdenow, imperfect as it is, becomes full shorter.

We know of no genus of grasses, that requires to be more studied, either in a botanical or economical point of view, than F. escula.

FESTUM, in a General Essay. See Feat.

FESTUM, in our Laced Books, is frequently used for a general court or assembly, because such were anciently always kept on the great festivals of the year.

Thus, in our chronicles, we read, that in such a year the king kept his festum at Winchester, &c. that is, he kept a court there at that time: " Rex apud Wiston. maximum festum & convivium celebravit, tempore Natalis Domini, convocatis ibidem principibus & baronibus totius regni."

TESTUS, Pompeius, in Biographie, a well-known grammarian, but of what particular age has never been ascertained. He wrote an abridgment of Vernis Phaccus "De Verborum Significatione." Scaliger pronounced this as one of the most useful works connected with the Latin language. It has passed through many editions; the one by Dacier in ulum Delphini, 1681, is reckoned the best. Moreri.

To FETCH Way, in Sea Language, is to be shaken or agitated from one side to another. The term is usually applied to a mast, bowprit, &c. when it is not sufficiently wedged, being loose in the partners; or to any body which is thrown out above by striking with the break or handle.

FETE, Fr. a feall, an entertainment of singing and dancing, introduced in an act of an opera, which always interrupts or fulfills the action. (See Ballet.) These obtrusive entertainments, says Rouleau, are only amusing in proportion as the opera itself is tiresome. In an interesting drama, well conducted, it would be impossible to hear them. We have sometimes thought the fame of the masque in Shakespeare's Tempest, though not in the feat of Romeo and Juliet, which is analogous and connected with the plot.

FETHARD, or FEATHARD, in Geography, a market and town of the county of Tipperary, Ireland, which before the union was represented in parliament. It is at present rather in a state of decay. Fethard is 76 miles from Dublin, and nearly seven north from Clonmel.

FETI, or Fetti DOMINICO, in Biographie, an historical painter, born at Rome in 1559. He was a disciple of Lodovico Cigoli. From Rome he went to Mantua, with the cardinal Gonzaga, on whose accession to the dukedom of
of Mantua he was declared painter to that court. In the works of this painter, who hardly merited to high an exaltation, there is a peculiarity of feeling and expression, but marked with colouring of a brown or blackened hue. He appears to have made his studies among the Lazaroni, as his characters are in general of a low cast, and even his best have their draperies thrown in a common and vulgar manner. Notwithstanding this, his small pictures, being executed with great freedom and firmness of touch, are much admired, which is not a little affihled by their general harmony in the tone of colouring. His works are scarce, as he died when only thirty-five years old at Venice.

FETICHE, in Modern History, a name given in Guinea to their divinities; one of whom is supposed to preside over every separate canton or district, one over every family, and one over each individual, which he worships on that day of the week when he happened to be born. On this day they are drest in white, and, as an emblem of their purity, beinrear their bodies and cloths with a kind of white loam or clay. Those of the better fashion, and especially the chiefs of the people, have, besides this birthday, another weekly festival dedicated to their fetiches, on which they kill a cock or a sheep; which sacrifice is confirmed by the prayers. The word fetiche, in a strict sense, signifies whatever represents their divinities; this may be a mountain, a tree, a large rock, a peculiar fowl or fish, with the head of an ape, or any such thing, as their fancy suggests. They not only believe these material substan-ces, or fetiches, endowed with intelligence, and the power of doing them good or evil, but also that the prieft or fetichere, being of their council, is privy to all that those divinities know, and thence acquainted with the most secret thoughts and actions of men. The household, or family fetiche, narrowly inspects the conduct of every individual in the house, and rewards or punishes according to the respective merits of each. Their rewards consist in the multiplication of their wives and slaves, and their punishments in the want of all these; but the most terrible of all punishments is death. At Cape Coast there is a public guardian fetiche, the highest in power and dignity. This exalted fetiche is a rock, that projects into the sea from the bottom of the cliff on which the castle is built. To this rock's year the black are offered by the priefts with ridiculous gestures and strange invocations, affuring the spectators that he receives verbal anwers from Taha, what times and seasons will be propitious; and for this intelligence every fisherman presents him with an acknowledgment suited to his ability.

Fetiches also denote among the negroes pieces of sophisticated gold, in which is a mixture of one-half or one-third part of silver and copper. These fetiches are cut by them into small bits, to the value of three farthings each, which serve for the current coin of the country. The fetiches of artificial and base gold are strangely shaped in mounds of a black ponderous earth. The negroes have also fetiches of unalloyed mountain gold, which they keep for ornaments, and sell them into trade.

FETIE, in Geography, a town of the Arabian Iraq, on the Embrates; 50 miles N.W. of Baffora.

FETISLAW, or KLADOWO, a town of Servia, on the Danube; eight miles E. of Orfova.

FETLAR, FILLAS, or Theodore's fles, one of the Shetland islands, lying two miles E. of Yell, and nine miles in circuit, consists for the most part of a rich black loam and fonce fand, which yields barley, oats, and palfure. It is separated from Yell by Colgrave sound, and has several creeks, but no secure harbour. Fetlar and North Yell contain 227 houses, and 1389 inhabitants. N. lat. 62° 58'. W. long. 1° 6'.

FETLOCK, in the MONEY, a tuft of hair growing behind the pattern-joit of horses.

Hence, the joint where it grows is called the fetlock-join1.

FETTOVA, in Geography, a town of European Turkey, in Bulgaria; 25 miles S. of Rufzak.

FETSA, in Modern History, is a name which the Turks give to the written judgments or decisions of the muft. The word in the Turkish language signifies sentence, and in Arabic, reply, or judgments of a wife man.

FETTEE, in Geography, one of the branches of the Indus.

FETTERCAIRN, a town of Scotland, in the county of Kincardine; near it is an ancient ruin called Penellas castle, in which Kenneth III. was murdered; 11 miles N.W. of Montrose.

FETU, FETUS, or AFFUS, a kingdom of Africa, bounded on the west by the river Benji, and kingdom of Commendo; on the north by the country of Atti; on the east by Sahi; and by the ocean on the south.

The crown is elective; and the capital, called also Fesus, stands in the inland country. Bussinou assigns to this kingdom 160 miles in length, and nearly as much in breadth; he describes it as commencing at mount St. Jago, or the river Seel, and terminating at mount Monton, or Montfort. It was formerly very powerful; but has been much reduced by civil divisions, so that it is now subject to the absolute control of the king of Commendo. Before these conquests it was filled with populous villages, and exhibited signs of wealth and plenty. Its principal riches consisted of grain, cattle, oil, and palm wine; and it was rendered beautiful and pleasant by the groves that shaded all the roads, and sheltered passengers from the rain and sun. It is extremely well situated for European settlements, on account of the neighbouring trading kingdoms and the cheapness of living. The Dutch had a fort at Elmina, which fee.

FETUS. See FORTUS.

FETWAS, in Geography, a town of Hindoostan, in Bahar; 20 miles S.W. of Patna.

FEU, CAPE, a cape on the E. coast of Majorca. N. lat. 39° 4'. E. long. 2° 28'.

FEU DE JOIE, in the Military Art, meeting a salute occasioned by some joyful occurrence, is generally confined to three distinct volleys fired by troops drawn up at open order, in which the soldiers elevate the muzzles of their firelocks to an angle of about thirty degrees, or more, thereby to prevent the discharge from doing injury to these in their front.

But in large armies this ceremony is conducted on a greater scale: the park of artillery firing round volleys between the several volleys, for which, in lieu of a word of command, signals are given by beat of drum, or eventually by the discharges of three cannon; the first indicating that the whole should "make ready," the second that they should "present," and the third that they should "fire." The re-loading is performed by attending to the full-man of each corps respectively.

In some instances the feu de joie is performed by discharging a "running fire" from one to the other flank, in lieu of firing by volley. This makes the ceremony last much longer, and proves more striking; especially when the feu-d'epis attached to the several battalions exchange as it comes to their turn. When the force is very considerable, each of the three rounds of "running fire" may occupy from a quarter of an hour up to a full hour. The music generally performs some loyal strain during the intervals of such protracted fires, and the ceremony is always concluded by
F E U

Feuds were called by various names, according to their respective natures: as feudum antiquum, which descended to a feu, &c. from his ancestors; opertum, refuting back again to the lord of the feu, where the blood of the last peron left feid in feu-simple is utterly extinct and gone; bavangium and individum, a title of nobility, not of a divisible nature, and defendable to the eldest fon in exclusion of all the reft; impriumeum, an improper or derivative feu; maturarium, defending to the fei from the mother; novum, one newly acquired by the feu, to which, in ancient times, only the defendants from his body could succeed, by the known maxim of the early feudal confitions; novum held ut antiquum, defendable in the fame manner as a feudum novum; patrunum, defendable from father to feu; and praetum, a proper feu, diftinguished from one improper, which are the two grand and general divisions. Blackti. Com. vol. ii.

FEUD is alfo used in our ancient confuits for a capital quarrel or enmity, not to be satisfied but with the death of the enemy; and thence usually called deadly feu. Feud, called also feida, and faida, in the original German signifies guerra; i.e. bellum, war. Lambert writes it fizc, and faith it signifies capitales inimicitias, or implacable hatred.

In Scotland and the north of England, feud is particularly used for a combination of kindred to revenge the death or any of their blood, against the killer and all his race, or any other great enemy.

FEUDAL, or FEUDAL, of or belonging to a feu or feu. We say a feudal matter, feudal jurisprudence, feudal seizure, feudal fytem, &c. A feudal lord, in default of fealty and homage from his vassals, may feize the fruits of the feu. A Neapolitan lawyer, called Curavita, has a Latin treatise of the feudal law, intituled "Practices Feudales." About the year 1790, a compilation of the feudal laws, as practised in Lombardy, was published at Milan, in two books, by two senators and counsels of that city, Gerardus Niger, and Obertus de Odo. In imitation of the "Pandects," they contain the opinions of lawyers, on questions concerning the feudal customs, with some imperial confitions, relating to feuds. They were long afterwards divided into five books by Cujacius, their bell commentator, before whose time they had obtained so great an authority in many countries of Europe, that they were received in courts of justice as parts of the civil law. The learned Craig ascribes this authority to imperial confitions contained in them, or by which they were confirmed; but Du Monlins, Giannone, and others say, that, like the books of Julianian, they acquired by degrees the force of laws, from usage, from the approbation of the people, and from the tacit consent of princes, who permitted them to be publicly taught in universities, enriched with commentaries, and cited in tribunals for the decision of causes. It does not appear that any such regard was paid to them in England; though in many points our laws were similar, as being derived from the same principles, and directed to the same ends. Yet it is not improbable that even in the latter times of king Henry II., and, still more in the next century, some parts of the English laws, concerning feudal eftates, may have been regulated according to their decision, by the statutes that were made, and, in the determination of doubtful cases, by the opinions of the judges.

When once the use of feis was thoroughly established in France, they would needs extend it much farther, and almost all the great officers of the crown thus became feudal; even the courts of justice were drawn in; in order...
The design of these infercations was to render the offices hereditary, after the manner of fees, which were now become so; and thus the offices of the grand chamberlain, grand butler, &c. came to be held by hereditary right.

As the northern nations brought in the use of coats of arms, by preferring down in their families the armorial bearings of their ancestors, shields, &c. as hereditary marks of honour, so they also, according to some, brought in the feudal law, by means of which, arms grew up to further perfection, as is evident by many armorial figures of ancient families, representing the acknowledgments and services they were obliged to perform to their own lords and superiors.

Thus, roses, cinquefoils, spurs, rowels, bow and arrows, hunting-horns, ships, and the like figures, were expressive of the services they were bound to do their lords; and hence these figures have become common in arms through all Europe. For instance, the old barons of Arran and Lorn were obliged to furnish their lord with a ship in time of war; and thence it is that their arms carry ships or llynx-plods to this time.

**Feudal System.** See Fee.

**FEUDATORY,** or **FEDATORY,** a vassal or person who holds of a superior in fees; i.e. on condition of yielding him fealty and homage, or other service. See FEALTY, Fee, Homage, and VASSAL.

The electors, princes, and free cities, of Germany, were all feudatories of the emperor.

**FEUDIOTE,** a recompense for engaging in a feud or action, and for the damages consequent thereon; it having been the custom of ancient times for all the kindred to engage in their kindred’s quarrels; according to that of Tacitus De Morib. Germanor. “Sicopere tam mimeticas fuerat patris, feu prophini, quam mimeticas, necesse ed.”

**FEUDIST,** a lawyer, or doctor, learned or much conversant in fees or fees. Du Molin is reckoned a great feudist.

**FEUDO,** in Geography. See St. Gotthard.

**FEVE.** See Acrelia.

**FEVENIST,** in Geography, a river of Carinthia, which runs into the Dravo 6 miles N.W. of Villach.

**FEVER,** in Medicine, a term employed to designate various conditions of the body, in which more especially the heat is augmented, the pulse increased in velocity, and the other functions more or less deranged.

The word, fever, has always been used with great latitude, as well by medical writers, as by mankind in general; and scarcely two physicians have agreed in the definition of it which they have given. The increase of the animal heat, however, which is commonly both visible to the touch of others, and disagreeing to the sick, has been the object of minute observation; whence the denomination of the disease, in almost all languages, bears a reference to this symptom. By the Greeks the word pyretos, pyretic, from πυρήτως, fire, was the appellation applied to fever; and the name used by the Romans, febris, was deduced from febre, or febræ, (signifying to be hot,) by a tranposition of letters common in most languages. From the latter our word is derived, probably through the medium of the French. That the idea of heat is predominant in the use of the term fever is obvious from the popular expressions which represent a person much heated, in any way, as “in a fever,” "Vol. XIV.

and which designate the cold and hot flages, or the rigorous and delirious heats of intermissions, by the words "ague" and "catarrh." Physicians, however, include, in the term fever, the whole of the phenomena which belong to the disease, the cold as well as the hot and sweating flages; that is, the beginning as well as the middle and end of the disease.

Fever, in the most extensive signification of the term, is the most general of all the morbid states to which the human constitution is liable; for, it is common to both sexes, to every period of life, and to all climates and countries. Sydenham affirms, that the various forms of fever constitute two-thirds of the diseases of mankind; and he has calculated, that as large a proportion as eight of nine of all who die are cut off by febrile diseases; a proportion which is probably not overestimated, if we include in the calculation not only all the forms of intermittent, remittent, and continued fevers, and the fevers accompanied by eruptions on the skin, such as small-pox, measles, scarlet fever, &c., but also the various local diseases and affections of the body, which are accompanied by fever, such as inflammation of the organs, whether induced by internal causes or external violence.

In reviewing the numerous forms of fever, however, it is evident that, for the practical purposes of the physician, this general application of the term is too vague and indefinite; since the circumstances under which fever occurs are materially different in various respects. The most obvious distinction, which has induced an universal division of fevers into two great classes, consists in a difference of origin; some arising from general causes operating on the body at large; while others depend on inflammation, or other local affection of a particular organ. The former have been designated primary, or idiopathic fevers; the latter secondary, or symptomatic fevers. In the more accurate medical vocabulary of the present day the term fever is applied only to the idiopathic fevers: in the other class of febrile diseases the state of fever is but a symptom, a secondary consequence of inflammation, or some other morbid change of a particular part of the body, which constitutes the primary disease; which this is removed, the fever ceases; but in proper fever, the symptoms are probably independent of any pre-existing organic disorder, and are not regulated in their course or termination by the progress or removal of any other disease. Idiopathic fever alone is, therefore, the subject of our attention at present; the various species of symptomatic fever will be found under their respective terms of application, according to the organ which is the seat of the primary disease. Thus, for the purulent and perinephritic fevers, depending on inflammation of the lungs, see Pleurisy and Perirephritis; for those arising from inflammation of the bowels, see Enteritis; and so forth.

Under the head of idiopathic fevers, those febrile diseases, which originate from a specific contagion, such as small-pox, measles, scarlet fever, &c., might with propriety be comprehended; inasmuch as the eruption on the skin, which characterizes them, is not the cause of the fever, but appears subsequent to the occurrence of the fever itself. Nevertheless, as these eruptive fevers differ most materially in their cause, their phenomena, and their termination, and originate from a distinct species of contagion, it is useful to separate them from the simple idiopathic fevers.

This plan has been adopted universally by the zoölogists. Dr. Cullen has constituted three orders of his first class of diseases, entitled pyretic, or febrile diseases, from the division which we have just described; the first order, comprehending the simple idiopathic fevers, is entitled "febræ," or fevers; the second, including the symptomatic fevers, is entitled...
entitled the order of "phlegmatic," or inflammations; and the third, comprising the eruptive fevers, is denominated the order of "exanthemata," or efflorescences. It may be added, that this scientific physician has likewise constituted two other orders of febrile diaphases; the fourth consisting of "hemorrhagies," from the lungs, uteri, &c.; and the fifth, entitled "profuse," or fluxes, containing two diaphases, catarrhal and dysenteric, which depend on a peculiar inflammation of the mucous membranes of the tracheal tubes, and of the alimentary canal. See Cullen. Nefol. Method.

Fever, properly so called, or idiopathic fever, is the subject of the present article. It occurs under the form of ephemeral, intermittent fevers, or agues; remittent, and continued fevers; the last of which appear under a variety of types, in the infallibility of the plague, gaol-fever, or typhus, low, nervous fever, &c. See the conclusion of this article.

Notwithstanding the great prevalence of fever in all ages and climates, and the universal attention which it has excited among medical observers, from the time of Hippocrates downwards, the diaphase still remains the subject of much discussion; and its essential nature, or the proximate cause of its symptoms, is still a problem in medical science. This obscurity will appear the less surprising, however, when we consider the almost endless varieties under which fever occurs: for not only are its modifications so various, that of those fevers, which are nominally the same, scarcely any two influences accurately resemble each other; but, of all the symptoms which constitute these varieties, not one can be found which is invariably present in every case,—not one, therefore, which can be considered as characteristic of the disease. In the technical phræologick, we are not acquainted with any pathognomonic symptom of fever. Hence, although the concourse of symptoms, which mark the presence of fever, is well known, and easily recognized by a moderate degree of observation and experience, and consequently capable of being accurately described, yet it is not easy to frame a definition of fever, which should comprehend every variety that may occur.

Boerhaave, the able and learned professor of physick at Leyden, at an early period of the eighteenth century, investigated the subject of fever more rationally than his predecessors: he found that these symptoms were generally observable in all fevers; and therefore he deemed the characteristic symptoms of fever, in which he has been followed by the notologists who have succeeded him. "In every fever, arising from internal causes," he says, (Aphorism 563.) "there is always a feverishness, a quick pulse, and heat, varying in degree at different times of the fever." But of these three symptoms, he considers the second, or quick pulse, as the essential or pathognomonic symptom, and not the heat, as was the opinion of the ancients. He observes again, in the 57th aphorism, "These symptoms, indeed, are present in every fever, but the quick pulse alone is present throughout its whole course, from the beginning to the end, and by that only the physicians judge of the existence of fever." It cannot be questioned, that these three symptoms are found in the great majority of instances of fever, and that the quickened pulse is the most universally observed, and continues during the longest period of the diaphase. But, on the one hand, these symptoms are common to the symptomatic fevers, as well as to the idiopathic; and, on the other, they have each been observed to be absent in different influences, even the quickness of pulse. By these three symptoms Dr. Cullen has characterized the whole class of febrile diaphases, the idiopathic, the eruptive, and the symptomatic fevers; in addition to which he has introduced the leison of some of the functions, especially of the muscular strength, which generally accompanies them. His definition of the class Pyrexia is as follows. "Foil horrorem, pulsus frequent, calor major, plures functiones laxe, viribus praefedit autem imminuit." These symptoms, occurring generally in the order here mentioned, are deduced from a correct generalization of the common occurrences in febrile diaphases; but if it can be shown that each of them has been occasionally absent, it will be a sufficient proof that none of them can be deemed essential to the existence of fever. On the contrary, it will be equally easy to prove that all these symptoms have been occasionally present, without the occurrence of fever.

The chilliness, shivering, horror, rigor, or horripilatio, which is commonly one of the first symptoms of idiopathic fever and often of symptomatic fevers, as has been observed by the best writers on the subject, is occasionally absent; the fever begins at once in the hot flage, or with some other symptom, as nausæa, or head-ache, to which the hot stage succeeds; and no cold stage, whether marked by the feelings of the patient, or of a by-faller, or by the application of a thermometer, occurs. For this fact we have the authority of Celsus; and among modern physicians Gorter, Burtheus, Fordyce, and others, have distinctly attested its truth. On the other hand, cold, eliminated by the means just mentioned, often takes place, wherein no fever can be admitted to be present, as in hysterical complaints. See Celsus, De Medecina, lib. iii. cap. 5, where he says, "saepe praebet a calore inimico," or Celsus. Corn. Med. Pract. 52. Burtheus, Inflit. Med. Pract. vol. i. p. 83. Fordyce, Differt. on Simple Fever, p. 11.

With respect to the quick pulse, which is deemed by Boerhaave, and his commentator, Van Swieten, as the effence of fever, and the only criterion by which the physician judges of its existence, the evidence of its absence, which the records of medicine afford, is very abundant. It might seem extraordinary indeed if quickness of pulse were the essential symptom of fever, that the ancient fathers of physick should have become so well acquainted with the diaphase, without paying much attention to the state of the pulse. Yet it is certain that Hippocrates has seldom mentioned the pulse, and lays little stress upon it; and we are informed by Galen, that he (Hippocrates) was the first writer who mentioned the pulse. The pulse, however, was noticed afterwards by Herophilus and Erasistratus, and particularly mentioned by Aretaeus. In the time of Celsus it was an object of considerable attention with physicians; but he expressly remarks, that in trusting to the pulse, as a test of fever, we depend on a most fallacious criterion (fallacilimina res); for not only external heat, the bath and exercice, but also fear, anger, and the other passions and emotions of the mind, even the anxiety of the patient on the approach of the physician will excite and depress, and otherwise modify the pulsations. "Quas venas autem," he concludes, "confectus medici movet, quam facile milie res turbant." De Med. lib. iii. cap. 6.

But not only is the pulse quickened by heat, exercice, and mental emotions, as stated by Celsus, and by other causes, when no fever can be said to exist; but farther, continued fever has been observed to go on even to a fatal termination, without any increased frequency of the pulse. The frequency of the pulsations in health varies according to the age, sex, climate, season, and to the particular constitution of individuals. It is only about a century since the pulsations were counted, and within that period authors have not agreed as to the number which constitutes a febrile pulse. It is admitted that in the adult age of men, the number of pulsations of the heart and arteries is commonly about 73 in a minute. (See Pulse.) But in particular constitutions
the pulse of health is found regularly at a much higher or lower rate: sometimes beating 80 times or upwards, sometimes 70, 67, or less in a minute. Dr. Fordyce counted the pulse of an old man in the Charter house, whose natural number did not exceed 25 contractions in a minute. It is obvious then that the disputes about the number of pulsations which constitute the febrile flat are frivolous: for the man whose natural pulse was 40 would be in a high fever in other respects when his pulse reached 60; while the person, whose pulse in health was at 85, might labour under slight febrile indisposition when his pulse beat nearly 120 times in a minute. But let us advert to other facts. Syl- denham long ago stated, that in the first days of a fever which he calls febris biamalis, the pulse continued like that of a person in health, "sanum pulsim non admodum absumus." (Tractat. De Hyrope, pollicerpto.) Werlhoff has noticed the same fact in small-pox, and Greding in a contagious epidemic fever. (Ludwig, Advers. Med. vol. i. p. 1. cap. 1. p. 22.) The pulse has been observed to be slower than natural, in several instances of malignant fever, by many clinical observers, both ancient and modern. Several of these are particularly referred to by Burletius (Loc. citat. p. 84. et seq.) It may be sufficient to mention Russil (Nat. Hist. of Aleppo, p. 232.), Sauvages (Nolod. Method. tom. ii. p. 327.), and De Haen (Nat. Medendi. p. 1. cap. 2. p. 53 et 117.) Nay, it sometimes happens, as in a case recorded by the last mentioned writer, that the pulse, which was slow during the continuance of the fever, becomes more frequent during the state of convalescence and health. The pulse, indeed, has been often observed to undergo considerable changes in the course of fever, when the reft of the symptoms continued unaltered. Dr. Fordyce remarks, that he "has seen, in many instances, a fever take place, and go on as a continued fever, so that in the middle of the second week the pulse has been frequent, from 100 to 110, or even more; the tongue covered with a brown fur, and dry; the skin dry; there has been great depilation of strength, colliquatives, violent pain of the forehead, delirium, strong evening exacerbations with rapidity of the eyes; in such cases the author has known the pulsations become as few as 60, 50, or even 45 in a minute, all the other appearances of the disease remaining the same, or the fever even increasing in all respects. This small number of pulsations, after continuing for two or three days, has given place to a number of pulsations as great as before, so that if a man had attended to the other circumstances of the disease, and not felt the pulse, he would have had no reason to suspect that the pulse had been fewer during that time. This the author has frequently seen in the patients attending St. Thomas's hospital, as it was shewn to him by Dr. Cullen, Sir John Strirling, Sec. &c." (Loc. citat. page 15.) It may be added, that Dr. Home remarks that patients have died of typhus under his observation in whom the pulse was not quickened. (See his Clinical Experiments.) On the whole, then, it cannot be doubted, that Bouchave maintained an erroneous doctrine, in flating the quick pulse to be pathognomonic of fever. See also the works of Pringle and Lind.

The increased heat is still less entitled to be deemed an essential symptom of fever, notwithstanding the labours of the Galenists to prove it the proximate of the whole disease. It is curious to observe the sophisms by which they attempted to reconcile the doctrine of their master, with stubborn facts, that are incompatible with it. Thus Senners affirms, that "it is not the heat generated in the heart, and thence communicated to the rest of the body." (which is Galen's hypothesis) that produces or constitutes fever, but the morbid dispersion which the heat occasioned, and which is inconsistent with the proper performance of the functions. Hence the heat occasioned by passion, violent exercise, or the bath, is not to be deemed fever, unless it reaches that degree of inflammation which disturbs the functions." (De Febribus, lib. i. cap. 1.) But the excitement of heat, by the same canes which raises the pulse, according to the observation of Celsus, its occurrence in hysterical and other diseases, not febrile, and its frequent absence during the whole course of fever, for which we may flate the authority of Fordyce, and other observers, prove that heat is not the essential symptom of fever. "Its heat, is, of Alcmares, cui credimus, color, aque fallax." (Celsus, loc. citat.)

The other symptoms, alluded to by Dr. Cullen, in his definition of febrile diseases, namely, "the disturbance of several of the functions, especially the depression of the muscular strength," although they commonly occur both in idiotopathic and symptomatic fevers, are common to a great variety of diseased, and were not flated as pathognomonic symptoms.

As there is no symptom, then, which, being invariably present, characterizes the disease, called fever, we can only obtain a knowledge of the existence and nature of the disease, from an attention to the concomitance and succession of the symptoms. This attention is extremely important in a practical view, not only from the great variety of fevers which require an appropriate variety of treatment, but also from the necessity of modifying the treatment in different stages of the same case of fever. We shall, therefore, detail the symptoms of fever in the order in which they usually occur, including the whole of those which have been seen in various cases, and leaving the modifications of the disease to be more particularly noticed under their respective appellations. The paroxysm of an intermitten fever is generally pointed out as the most perfect example of the febrile flat, both in respect to the distinctness and the regularity of the symptoms, which characterize it. This has already been described under the article Ague. When the paroxysm is lefs severe, and does not recur, it is denominated an Ephemeris, (which see.) There is perhaps more of fancy, however, than of sound observation, in the affinity which has been described between the intermitten and continued fevers; and especially in the assumption of the intermitten paroxysm, as the prototype of all febrile diseases; and in considering continued fevers, as consisting but of a series of these paroxysms, the succeeding one commencing before the termination of its predecessor, so that no period of intermission intervenes. Such, however, has been the practice of our best authors; Dr. Cullen, the tymeniac, has been followed by Dr. Fordyce, the practical physician, in this account of the disease.

Symptoms of Fever.—The commencement of fever is generally marked by some degree of languor, listlessness, and general uneasiness; the patient feels himself ill, without being able to refer his uneasy feelings to any particular part of the body. There is also a little fevers, or a desire frequently to change the posture, but at the same time the sense of weariness disposes the patient to rest, this inclination the motions when made are sluggish, and frequent yawning and stretching accompany the attempt. The mind is affected in a similar way; it cannot rest upon any object; the attention is not under the command of the will, but wanders from one subject to another; and the ability of exerting the muscular powers, or of performing any of the body becomes actually diminished; there is likewise an actual inability of exercising the faculties of the mind; the patient cannot think or reason, even upon his ordinary affairs, with
his usual state. Along with these symptoms, but more frequently after them, he feels a sensation of cold, commonly first in his back, but afterwards over the whole body; the same kind of sensation that he feels when surrounded by a colder medium than he is accustomed to: he wishes, therefore, to go near a fire, or into the rays of the sun, or to put on warmer clothing. At the same time the face and extremities are observed to be pale, the features shrivelled; the bulk of every external part is diminished, and the whole body covered with hairs, as if cold had been applied to it. This sensation of cold varies much more in different instances of incipient fever, than the languor and latitude before-mentioned: in some cases it is very slight, in others not at all felt or noticed; whilst in many instances, particularly in the intermittent fevers, it becomes so great as to produce a tremor or quaking in all the limbs, with a chattering of the teeth, and frequent rigors of the trunk of the body. In this state, the actual heat of the surface, whether measured by the sensations of a by-flanker, or a thermometer, is considerably diminished; in the extremities in particular it is many degrees below the standard of health. (See Burletus, loc. cit.—Currie, Medical Reports on the effects of Water, cold and warm, in Fevers, &c. p. 168, 2d edit.) Not only on the surface, as is generally imagined, but even over the whole system, the heat is probably diminished; the air expired from the lungs, feels cool to the back of the hand, held near the mouth. Dr. Currie states, that he has found the heat under the tongue, and at the axils, as low as 94, 93, and 92 degrees of Fahrenheit’s thermometer. (The healthy temperature of the human body, it may be observed, is about 98° of the same thermometer.) Dr. Fordyce affirms, that 93° was the lowest degree of heat that he had witnessed under the same circumstances. (First Dissertation on Fever, page 40.) The sensations of the patient, however, do not always correspond with the actual degree of cold, as measured by the thermometer, or by the sensations of others; for it has been remarked, especially towards the termination of the cold stage of the fever, that the patient feels himself cold, even on those parts of the body which are burned, by the application of a thermometer, to be of the natural heat, or even hotter than they usually are in health. With this state of coldness, the sensibility of the body is considerably diminished; all the sensations, but especially those of touch and taste, are less accurate and distinct than in the healthy state. Dr. Fordyce remarks, that, "in the attack of fever, such a degree of insensibility, with a feel of coldness, has in many cases taken place, that even hot habiliments have been applied in such manner as to coagulate, may, perform the chemical analysis of the part, without any sensation of heat having arisen in the mind of the patient." (Loc. cit. p. 49.) The diminution of the faculty of sensation is very various in different instances of the attack of fever.

Upon the first approach of febrile languor the pulse is not always altered in respect to frequency, but it always becomes weaker than before; sometimes it is also slower than in health for a short time. But as the sense of cold increases, it becomes smaller, and gradually more and more frequent, and often irregular. While the contractions of the heart and arteries are thus feeble, all the secretions of the system are likewise diminished. The tongue and mouth become dry and clammy, in consequence of the diminished supply of saliva and of the mucus of those parts; the skin also becomes dry, as well as pale and cold, there being little or no matter of perspiration poured out. The changes in the urine are still more remarkable; the impaired action of the secretory vessels of the kidneys is evinced by the diminished quantity of the urine, at this period of fever, as well as by the paleness of its colour, in consequence of its holding less of the mucilaginous and fatty parts in solution than in health, and by the absence of any cloudiness or deposition when it cools. There is generally also a smaller quantity of secreted matter evacuated from the intestines at the commencement of fever, or in other words a degree of constipation, which implies a deficiency of the fluids secreted from the inner surface of the alimentary canal, as well as of the bile and pancreatic liquor, by which the faces are rendered more liquid and moveable, and the bowels are stimulated to action. Analogous to these changes in the state of the secretions are the sudden and considerable detumescence of swellings, which may happen to subside on the surface of the body, and the drying up, or effusion of the discharges from ulcers and wounds, during the cold stage of fever.

The respiration also suffers some change in the attack of fever, being often short and frequent, and sometimes attended with a cough, more particularly in intermittent fevers. There is at the same time a great anxiety, or a sense of weight, fullness, and great uneasiness in the breast. This diffusing feeling, which has been thought by some physicians a pathognomonic symptom of fever, and hence denominated febrile anxiety, is totally different from, and independent of, the general uneasiness all over the body, which was before mentioned, and often occurs in a very in proper degree. It resembles that anxiety which takes place from grief, fear, and other depressing passions of the mind, and which is also accompanied by paleness, and diminution of size of the veins, which are seen on the surface. The patient likewise feels irregularly, as one under the influence of the passions just noticed, and frequently sighs deeply, as if to free himself from the load that oppresses the region of the heart.

At the beginning of the attack of fever, sometimes as the very first symptom, but often later, a dull pain is felt in the small of the back, which seems to occupy the lumbar vertebrae, but is not accurately referred to any particular point. It is very similar to the pain which arises from weakness or fatigue; but, unlike that, according to Dr. Fordyce, it is equally felt in the horizontal, as in the erect posture of the body. The head at the same time is affected with pain, which is commonly felt in the forehead over the eyes, and feels to the patient as external; sometimes it likewise occupies the back part of the head, and occasionally it is felt all round the head. In severe cases it becomes more severe, but commonly increases as the attack proceeds; it is usually attended with a sense of weight, and is often augmented by light falling upon the eyes. A similar pain generally arises all over the body, which the patient often describes as felt in all his bones, without being able to particularize in what part of the body it is felt. Sometimes it is more particularly confined to the larger joints; and it is occasionally attended with great foreheads, as from over-fatigue. Such foreheads, however, is more commonly confined to the subsequent periods of the disease.

From the commencement of the attack of fever the natural functions are always deranged. The changes in the appearance of the tongue are among the first indications of this derangement. At first the tongue appears to be thinly covered on its upper surface with an extremely viscid fluid, especially in the middle and towards the root, the edges and point being nearly free from it. The under surface of the tongue, below the point, is fearfully covered with this matter. Sometimes, at the very beginning of the disorder, the covering of the tongue is a solid crust of a whitish
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colour, adhering so firmly as to be incapable of being scraped off; sometimes it verges towards a brown colour.

At the approach of the cold stage of fever the axillary is commonly affected; the appetite for food ceases, and aversion even to the light or smell of food often takes place. Dr. Fordyce remarks, that he "has known several individuals where persons fitting down to the table with a ravenous appetite, an attack of fever having suddenly taken place, in less than two minutes they have been unable to eat any thing, and have been seized with perfect aversion even to the smell of food." (Loc. cit. p. 93.) Sicknees at the axilla often comes on at the first attack, and this is increased occasionally to such a degree as to produce vomiting. More commonly, however, this does not take place at the very commencement; but the disorientation of food increases gradually to nausea, then to vomiting, which in some cases is very severe, not only the contents of the stomach being evacuated, but likewise the bile of the duodenum, and of the glands, the secretory duets of which open into it. Bile, therefore, and the pancreatic juice, are thrown up, together with the contents of the stomach, and the other fluids secreted into the stomach and duodenum. Of these fluids, however, the bile is the most conspicuous from its colour, taste, and smell, and it has, therefore, often been observed by practitioners, while the gastric and pancreatic, and other juices secreted into the duodenum, as they are not very conspicuous from their sensible qualities, have not been taken into the account. Combined with the aversion to food, and sicknees, there is generally a considerable degree of thirst.

Few other symptoms, which are observable at the commencement of fever, remain to be mentioned. The rate of the countenance is very peculiar and characteristic, from the moment of the attack. It not only becomes pallid, or of a dirty hue, in common with the rest of the surface of the body, but it assumes an expression of dullness or heaviness, partly in consequence of the languid action or relaxed condition of the muscles of the face, and partly from the same condition of the muscles of the eye-ball, by which its form and motion are altered, and its usual brightness and quickness are impaired. The disposition to sleep is diminished or lost; or, if it occurs, the repose is short and interrupted, and very imperfect, so that there is much dreaming, during which the ideas that present themselves are mostly of an unpleasing kind.

When the sensibility of cold, and the attendant symptoms have continued for some time, (the period being very various in the different kinds of fever,) the cold becomes less violent, and is alternated with flushes of heat. In the more severe continued fevers, it frequently happens that the cold is not permanent for any length of time, but that this alternation of chills and heat takes place from the beginning. By degrees the cold goes off entirely, and a heat greater than natural is extended, at first equally in different parts, but at length generally over the whole body; but even when it is so far advanced, that the heat, measured at the axilla or under the tongue, is greater than the standard of health, a slight access of external cold will produce a general chilliness. There is no regularity in the restoration of the heat to the surface; in some parts the heat is above what is natural, while in others it remains below this standard; and hence arises that mixed sensation of cold and heat, which every one acquainted with fever has experienced, in the transition from the cold to the hot stage of the paroxysm. This inequality of the distribution of the heat is less in the simpler forms of fever, and greater in those which are more complicated and irregular. In general the sense of cold predominates, even after a morbid heat has taken place at the axilla, under the tongue, and in different parts of the thorax and abdomen. At length, however, the heat of the surface becomes general and uniform, rising to 102°, 103°, and sometimes 104°, of Fahrenheit's thermometer. Different authors indeed speak of febrile heat four or even five degrees higher than this; but such heat has never occurred under the observation of Dr. Fordyce or Dr. Currie, the best authority on this subject: the writer of this article has frequently employed the thermometer, in cases of continued fever, and never observed a higher temperature of the body than 104°, in intermittent or continued fever, the patients being in cool apartments, with very light bed coverings. The sensation of heat becomes at length strong and steady, and the action of external air does not produce a return of chilliness as before; this sensation is most powerful in the extremities, particularly on the palms of the hands and soles of the feet.

The incrcase of the circulation takes place at the same time as the returning heat, and often in the same unequal manner, being evidently greater in some particular parts, than in others. It is very frequent, that one part shall become red and engorged, while the other is pale and contracted; the veins of the one being full, and the blood flowing in them more rapidly, while those in the other remain contracted. This shall continue for some time, when the parts become affected in the opposite way; the arm which was florid and dilated, becoming pale and contracted, and vice versa. This shifting, however, remains but a short time in simple fever, perhaps not above half an hour; in the paroxysms of intermittent it continues longer, and still longer in the first attack of continued fever. Universal redness at length takes place; the features of the face and other parts of the body recover the usual fize, and become even more turgid; and the superficial veins evince the greater circulation now going on through them by their fullness and increased fize. The skin is relaxed and smooth, no longer exhibiting the goose- skin appearance, by its contraction round the little glands and roots of the hair, but it continues for some time dry. The pulse now becomes fuller and stronger, and its frequency continues or is still farther increased; in simple fevers, it beats occasionally at the rate of 140 or 150 strokes in a minute, with a considerable degree of fullness and hardness (Fordyce); but in the hot stage of intermittent, and in the heat of continued fevers it is most commonly from 9 to 110, at this early period of the disease; subject, however, to great variation according to the constitution of the patient, and the type of the fever. The respiration, though more free than during the chilliness, continues full, frequent, and accompanied by a sense of load and anxiety, which the patient endeavours to remove by occasional labours efforts, and deep sighing. The respiration shall remain diminished: the skin is parched, no perspiration breaks forth; the tongue and mouth are dry and parched, and the fur on the former becomes thicker, the urine, though it becomes lighter coloured than in the cold stage, remains transparent, and deposits no sediment; and the bowels are colicky. The thirst is considerably increased as the heat advances, the nausea and vomiting gradually diminish, but the aversion to food is augmented.

The corporeal strength and the mental powers become more oppriessed; the sensibility, however, is restored in general with the returning circulation and warmth of the surface; sometimes it becomes even more acute than in the healthy state, so that the skin is more easily irritated, the eyes are occasioned with the light, and the heat noise is heard with
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with pain, and greatly disturbs the feelings of the patient. The attention becomes left under the control of the will, and the faculty of recollection and the reasoning power are exerted with difficulty, and imperfectly, so that some confusion of thought takes place, which often arises to delirium, when the hot stage is completely formed: occasionally, indeed, a degree of delirium occurs in the beginning of the cold stage, but more frequently in the subsequent periods of the fever. The delirium consists in various and disordered dreams, which conflict or occur in the disordered and irrational fancies, which take place in the first stages of fever, may be considered as the flightest degree of delirium. (See the articles Delirium, and Dreams, in Pathology.) In the next degree the patient, when he awakes, is some time before he can attend to the impressions made on the organs of sense: he does not know his bed, his bed-chamber, or his attendants for a few minutes, but seems to awake as if it were a second time, and becomes perfectly feasible. If the delirium is in a little greater degree, the ordinary impressions of external objects produce no effect; the ideas, which float in the mind rapidly, seem to be excited without train or connection; the association being carried on by the internal impressions alone. If the attention of the patient, however, be strongly excited by external impression, he is capable of distinguishing the surrounding objects, and of returning correct answers to questions put to him; but that strong impression being withdrawn, he relapses into his delirous dream. As the delirium increases, with the advance of the fever, the faculty of distinguishing the objects that surround him gradually diminishes; he begins to overlook his ideas in words, i.e., to talk incoherently; the ideas which present themselves rapidly, and without apparent connection, are generally disagreeable and distressing. He is sometimes in a church-yard among tombs, sometimes falling from a precipice, sometimes pursued by wild beasts, in the midst of conflagrations, &c. The delirium increasing, he becomes completely insensible to external objects. This is a common progress of the alienation of mind in fever, beginning on the second or third day, or later, and increasing to the fourteenth or fifteenth, if the patient survive so long; at first being only obvious in the night, or during the imperfect slumber, or in the waking moments, when external impressions are fewer, or almost entirely excluded; but afterwards continuing night and day without intermission.

With the beginning of the hot stage, the head-ache is commonly increased, and appears to be diffusible from that which took place in the cold stage. The latter pain, Dr. For-}

dyce remarks, always feels to the patient as external; it is clearly a pain affecting the integuments of the head, perhaps the skin alone, atvoid the pericranium; but the pain which arises in the second stage is felt by the patient internally, and gives him the idea that there is something distending the head or the brain, so as to attempt to burst the cranium. (See First Diff. on Fever, pp. 83 and 228.) In the mean time the carotid and temporal arteries heat full and flush, the eyes are rather red, and the face is flushed. Connected with these symptoms, which obviously imply an increased quantity and impetus of the blood carried to the brain, the organs of sensation, while fully capable of conveying impressions to the mind, nevertheless produce sometimes erroneous impressions. Thus the patient can see, but he mistakes objects; he fancies one individual is another, or that a man is a pail: and his organs of hearing, which are also more easily affected, do not convey the same perceptions, which the same organs would excite in health. The same thing happens with regard to his other senses.

All the symptoms above enumerated increase from the second day of fever. The tongue grows more foul, and the crust which forms upon it thicker, until the middle of the second week. Towards the end of the second week this crust often disappears more or less, and the surface of the tongue looks raw when moist, and when dry has a polished glaze, especially about the middle, some of the crust remaining upon the fides towards the edges (Fordyce.) Before these symptoms, however, have advanced to the degree just described, the general heat has continued for an indefinite time, (in the ephemeral and intermittent fevers a few hours, in continued fevers several days,) it often happens, that a partial moisture begins to appear upon the skin, generally on the forehead, which extends gradually downwards to the neck and breast, and at length a free sweat takes place from the whole surface of the body. At the same time the symptoms of the first stage of the fever begin to abate, sometimes one giving way first, and sometimes another, so that it cannot be said which has the priority; sometimes the weight and anxiety about the precordia are first observed to diminish, sometimes the change of the pulse from hardnefs to softness is the first obvious amendment, and sometimes the relaxation of one or other set of secretory vessels, &c. Such a change of the symptoms, terminating speedily in a restoration of the health, has been called, by a term borrowed from the Greek, a Grfe, (which fever,) and the excrated fluids, which are poured forth at the time of this change, have hence been denounced critical discharges. The most striking appearance; both to the patient and by-hand, and the precipitation, which is freely carried to the extent of profuse sweating, in intermittent, and the simpler forms of fever, but sometimes amounts only to gentle moisture. While the sweating continues, all the symptoms of the previous stages abate; the preternatural heat is gradually diminished; the pulse becomes softer and less frequent; the breathing is likewise frequent, and more free, and is unaccompanied by sighing, and the anxiety and heaviness in the chest are greatly alleviated; the head-ache gradually goes off, and the pains of the limbs and extremities cease; the numbness and vomiting no longer distress the patient, who now acquires a relish for light nourishment; the thirst is removed; the mouth and tongue become moist, as the salivary and mucous glands pour out their fluids, and the tongue becomes gradually clean, first upon the edges, afterwards in the middle and near the root, the crust, which had formed upon it, coming off in small flakes, until the whole surface is in its ordinary state. The secretions of the liver, pancreas, and intestinal glands being restored, the bowels begin to act, and the evacuation from them comes to its ordinary quantity. A loose fluid is commonly passed, at the end of a paroxysm of intermittent fever; and sometimes a diarrhoea comes on in continued fever, and being the most obvious, is then considered as the critical discharge. The urine generally undergoes some peculiar changes in the crisis of fever; it is not only secreted in larger quantity, but, although bright and transparent when discharged, if allowed to remain for some time, it is observed to grow turbid, as if containing a quantity of a yellowish-red powder, and at length to deposit flaky crystals of a dirty red colour, commonly termed a leucorrhoea sediment. Tumours, which were diminished during the cold, and more painful in the hot stage, return to their usual size during the sweat, and ulcers again begin to discharge matter. The intellectual functions are also restored during the crisis; the attention of the patient is no longer absorbed by his uneasy feelings, the confusion of his head is relieved, and he is not harassed by the perpetual recurrence of disordered images to the mind, especially in his flumbers; a disposition to calm sleep
Fever.

It was remarked by Hippocrates, and the majority of the ancient physicians, that these crises occurred more frequently on particular days of the fever, which they, therefore, observed with great care, as affording both particular indications in practice, and the means of prognosticating the phenomena of the subfrequent periods of the disease. Hence they called these days Critical days, (which we have already described under that head). These periodic changes, happening on particular days, are, however, seldom distinctly noticed in this country; they seem to occur more decidedly in warm climates, where all fevers have a greater tendency to assume the remittent form. Dr. Cullen, who believed that even in this country these critical days were observable, though less distinctly than in hot climates, explained their occurrence upon the principle, that continued fevers were in some degree disposed to take on the types of intermitents; and in this principle he has been followed by Dr. Fordyce. (See Cullen, First Lines, § 642, and Fordyce, Third Discur. on Fever, part i. p. 126.) But it must be remarked, that the doctrine of critical days, as taught by Hippocrates, was ridiculed by Aclepiades and Celsius, who practis in the same climate with Hippocrates; and in the same climate with Galen: (See Celsius, loc. cit. lib. iii. cap. 4.) and Herophilus altogether denied its truth. See Critical Days.

In this country, and in cold climates in general, continued fevers are seldom terminated by crises. Some practitioners have maintained, that a crisis never takes place, whilst others have insisted that crises happen in all continued fevers. Dr. Fordyce judiciously remarks, that these extremes of opinion are both inconsistent with correct observation. It is admitted, however, that crises occur much less frequently in this climate than in hotter countries; and we think that the physician just mentioned considerably over-rated the proportion, when he says, that "not above one-third of the fevers which happen in London are terminated by a crisis." (Loc. cit. p. 126.) We believe the proportion to be very far below this statement. In the great number of instances of fever, no crises takes place, but the disease terminates in a more slow recovery, or in death.

The symptoms, before enumerated, increase gradually to the end of the first, or middle of the second week; sometimes by the seventh day the symptoms have attained their greatest severity; sometimes, too, the second week is gone through without very severe symptoms, and in other cases symptoms of the greatest difficulty and danger then occur, and there are all gradations between these extremes.

The appearances in the second week, when the fever is not extremely severe, are often as follows. The pulse is frequent, beating from 100 to 110, in the evening, and in the morning somewhat less; the skin continues dry and hot, in various degrees; the tongue is covered with a brownish fur; the appetite is often totally lost; thirst continues, but is often complained of less during the second than during the first week; and the depredation of strength is considerable. The sleep is disturbed and short, and the delirium is manifested in the intervals by the incoherence of the observations of the patient, until he is completely roused by some strong impression on the senses. In the morning the delirium is less than in the early part of the night, and the sleep sometimes tolerably quiet; even during the day there is considerable confusion, and occasionally much fitfulness of intellect. Hence perhaps the thirst, as well as the headache, and pains of the back and limbs, is less complained of, rather than from actual relief or diminution of these symptoms. The eyes have a dull and confused appearance, and commonly some degree of redness, from a number of small vessels dilated with blood. Sometimes a degree of fluxor comes on in the morning, and continues till the more active delirium of the night. If this state should remain, Dr. Fordyce observes, till about the fourteenth day, the evening attacks become by degrees less, but the fluxor continues, with delusions, and inattention to external objects, and these appearances remain the very last symptoms of the disease.

Very frequently about the end of the second week, and often sooner, the symptoms begin gradually to diminish in severity. The first appearance of this abatement is not uncommonly a cleanliness and healthy look about the edges of the tongue; sometimes, although not very generally, a sweating takes place all over the body, and the skin afterwards continues moist; more commonly the moisture and softness of the skin appear in a less marked manner. The delirium abates altogether in the day, and returns less severely at night; or if the patient be dealt with some fluxor, these symptoms are little changed in the twenty-four hours; but remains until the whole of the disease has disappeared. The depredation of strength goes off, but leaves real weakness behind. The urine deposits sometimes a copious lateritious sediment for a day or two, and afterwards returns to its natural appearance. Sometimes there is a copious lateritious sediment in the urine made in the night, and a mucus one in that made in the day time. The colic stools go off; and the faces return to their ordinary appearance; and all the secretions become gradually incrusted, not equally, but sometimes one more speedily, sometimes another. The eyes, unless when the delirium has ended in fluxor, begin to have a more healthy appearance, are more composed and clearer, and express a greater attention to the objects around them. The sleep returns, but not equally; the patient sometimes sleeping a quiet, at other times a restless night. The appetite returns, although seldom regularly; sometimes it is voracious, but the patient is withstanding satisfaction with a very small quantity of food; in the other cases it returns very slowly. Although the depredation of strength sometimes goes off almost at once, yet it leaves the patient often with a greater feeling of weakness. Thus, however, the whole disease disappears, and the patient recovers his strength very quickly.

But although this favourable termination of fever occurs in a large majority of instances in this country, it is nevertheless a diffical frequently fatal, and, under particular circumstances, the cause of great mortality.

When fever terminates fatally, the symptoms present themselves chiefly under two different aspects, but variously modified, approaching to each other, or even partially combined. The individual varieties are impossible to describe; a knowledge of them can only be attained by personal observation of numerous cases at the bed-side of the sick. One of the forms, just alluded to, consists principally of a great aggravation of the symptoms of the hot phase. The heat of the skin continues great and pungent, and its surface dry and parched; the countenance is flushed, and the eye suffused with redness, and intolerant of light; the headache is severe, little or no sleep is obtained, the delirium is augmented, and is accompanied with extreme restlessness, often with vociferation, and even great muscular strength, so that the patient is with difficulty confined in bed; and the pulse is frequent, with considerable hardness. About the end of the second week these symptoms suddenly change; the delirium ends in an indistinctness or confusion approaching to fluxor, the articulation becomes indistinct, the
the breathing laborious, the strength fails rapidly, cold sweats, and convulsive motions ensue, and the patient is cut off in a few hours. Sometimes symptoms of inflammation of the lungs supervene, and continuing together with the delirium, hot skin, frequent pulse, and brown tongue, the patient dies with symptoms of suffocation; and sometimes inflammation of the integuments, or other important organs, being superadded to the original fever, accelerates and modifies the fatal termination. This has been called inflammatory fever. The other form of the disease, above-mentioned, is extended more commonly to the third week, sometimes later, and the progress of the symptoms is more gradual. The depression of the muscular powers continues to increase with the disease; the eyes become dull, dull, and listless; the countenance dejected, and of a dusky hue; the delirium is attended with a low muttering, and the patient lies without the disposition or the power of making any exertion, or he picks the bed-clothes; the tongue becomes eroded with a dark brown or black matter, a similar fords collects upon his teeth and lips; the pulse is frequent, beating from 120 to 150 times in a minute, and is at first thin, small, and feeble; the respiration is also weak, generally frequent, and interrupted by sighing or a dry cough; the voice becomes indistinct or inarticulate; and there are light convulsive twitches, or subfusus tendinum. At length the prolifation of strength becomes extreme; the patient lies on his back, being unable to support himself in any other position, and even slides down towards the bottom of the bed; he is altogether insensible to external impressions; the phinlachts, as well as the muscles of voluntary motion are relaxed, and he paffes his hands and wrists involuntarily in bed; the pulse becomes very feeble, tremulous, and feecernly to be felt at the wrist; partial, clammy sweats break out; the eyes appear glazed and fixed, and the other features shrink; the patient is unable to swallow; his breathing becomes irregular and laboured, attended with some noife in the throat, as the fatal event approaches; the extremities grow cold; and, often after several days, with a dark hue, the patient falls insensible, or life finally ceases. When fever assumes this form it terminates febrile, or the nervous, malignant, &c. fevers of authors.

There are some other appearances, which, though not the ordinary attendants on fever, occasionally occur, especially when the disease is of a severe kind, and which have been considered as evidence of malignancy, or of putrefcence. Generally in the second week of the disease, but sometimes as early as the fourth or fifth day, (see for John Pringle's Observations on Diseases of the Army, part iii. chap. 7, and Huxham on Fevers, chap. vii. p. 97.) an eruption of spots, not elevating the cuticle, of a red colour, sometimes pale, often darker, or even of a livid or purple hue, appears on the skin; these spots, or petebites, are thickl upon the brow and back, left numerous on the legs and arms, and are feblom, if ever, seen on the face. They were first described, among the moderates, by Ingraffia of Naples, afterwards more particularly by Franclarius, under the names of livide, pustule, or petebite; whence also the false apppellations were given to the fevers themselves. (See Franclarius de Morbo Contagioso, lib. iii. cap. 4.) At first they appear in fever, most frequently in cloae and crowded situations; formerly they were very frequent attentants on the fevers which occurred in the persons under confinement in close cells, or crowded apartments in our prisons. Dr. Willan has stated, however, upon the authority of the present surgeon of Newgate, that since a general attention to ventilation and cleanliness has been adopted, petechiae do not now appear more than one cafe of fever in thirty in that prison. He has also added, from the observation of the physician of the Fever Institution, in London, (the writer of this article,) that the proportion of cases, in which petechiae occur in that institution, is about one in forty-two. (See Willan on Cutaneous Diseases, order iii. gen. Purpura, p. 468.) Sometimes the purple spots are of a large size; in which case there are often also livid blisters, or stripes like the strops of a whip, rubicuse, and hemorrhages break forth from the internal parts, as the bowels, lungs, stomach, and wherever the surface is covered with a very thin cuticle, as from the nostrils, the gums and mouth, &c.

A rash of a different species, which Dr. Willan has termed rogalus, "a rose-coloured effuence, variously figured, without wheals or papule, and not contagious," (Loc. cit. ord. iii. gen. Purpura) sometimes makes its appearance in fever, of the typhous type; sometimes it precedes the formation of purple spots and blisters, and in other cases it is seen early in the fever, but remains only for a short time without any material consequences. Some other cutaneous appearances occasionally occur, as mentioned by Huxham, (Loc. cit. gen. Purpura,) such as milary fulides, a feebly effuence about the lips and nose, and aphthae.

After-Care on Diffusion.—An examination of the bodies of those who have died of fever, though it has often thrown light upon particular symptoms, especially on those which have occurred late in the disease, has nevertheless failed to elucidate the subject of fever in general. The appearances which have been presented to the view of the dissector have been so various, the organs affected so different in different instances, even when each difference could not have been anticipated from a knowledge of the symptoms, that the principal general inference which can be deduced from the observations of the anatomists may be expressed in the words of Ricients, (Seclis Praxis Medica, lib. xxvii. cap. 2. Appendix,) "that acute and dangerous fevers... carollum fieri fumme intercet peculiare virescere capillus affectionem, et ploe- rumque inflammatione; quare iniquum omitter eura hypochondriacum, capitis, thoracis, uteri, renum, et vesicae ut in manu non observatum, non longum parent inquietissimum intercum, ut ci. quod fieri patet, lublimatur." Some one or other of the viresce are most commonly disturbed, especially by inflammation, in the course of those fevers, each of which demands our attention respectively, in conducting the cure, according to the severity with which it suffers. Dr. Donald Monro has remarked, that, in fatal fevers, "the feble matter is apt to fall on particular parts, and there to create absceffes; particularly in the brain, the lungs, and the glandular organs." (Treatise on Military Hospitals, vol. i. p. 257.) On the whole, it would appear, that the brain is the organ which has been found to have suffere moft by the attack of acute idiopathic fever. But we have to ob- serve, with regret, that diffcctions of bodies, cut off by fever, have been often too incompletely examined, to enable us to draw any satisfactory comparative conclusions from them. Thus even for John Pringle acknowledges that of the few diffcctions made under his inspection, none were directed to the brain or to the bowels only, all the cavities being examined but by a small number of cases. In those instances of fever, in which the functions of the brain were much disordered, that organ has exhibited several morbid appearances; the most frequent of these are a congestion of blood; the vesicles of the pia mater, or the veil and membrane, being all diffcnded, as if injected; the brain itself, when divided, presenting a number of red points, which pour out blood; the arachnoideal coat is not frequently at the same time separated from the pia mater by the interposition of a gelatinous or serous fluid; the
these membranes are both occasionally thickened, their transparency being partially lost, and they sometimes adhere closely together in particular parts, as well as to the dura mater. Occasionally an effusion of serum is found in the ventricles of the brain. Sometimes, though comparatively in rare instances, the inflammation of the brain has been so decided, as to have terminated in suppuration, or abscesses of the substance. These have been chiefly observed in the lobes of the cerebrum, the cerebellum in general being less liable to disease: but two instances of purulent matter being formed in the cerebellum are noticed by Sir John Pringle. (Loc. cit. part iii. cap. 7.) Even suppuration of the cerebrum is not a common result of fever in this country. Dr. Fordyce says, that he has cau.sed the heads of many patients, who have died with very great delirium in fever, to be opened, and never found any marks of suppuration. Most commonly the brain appeared exactly as it is commonly found. Sometimes the blood-veils were dilated with blood, but never was any suppuration found; generally no uncommon appearance at all." (Third Diflert. on Fever, part i. p. 68.) In the yellow fever, Dr. Jackson states, that "the brain upon dissection appears to be more or less affected in the majority of subjects who die in the acute stage of the disease; the membranes are then inflamed, or the blood-veils turgid to an extraordinary degree, give an appearance of commencing gangrene rather than of inflammation, properly so called; water is sometimes found in the ventricles, with evident effusion in the interstices; but this is an effect not general, not even frequent." In the accounts of an epidemic fever, which occurred at Geneva, in the year 1803, published by two physicians, it is stated by both that congestion of blood was often found in the brain, but in other cases the brain was in its natural state. And a Dr. Esfield, who published an account of an acute typhus, as it prevailed at Leghorn, in 1799, observes, "in very many careful dissections of the brain (though I only once detected an abscess, and this was in the right hemisphere, about half an inch in diameter) the vessels, particularly those in the vascular membranes, almost always appeared turgid with blood. The four ventricles abounded with water, and sometimes a good deal of extravasated blood was present. The cortical substance was inflamed, soft, and fucid," (See Beddoes 1803.) The following circumstances does not necessarily imply inflammation. It was observed by Chamcon (Obf. Clin. Pract. Obf. 25.) that the substance of the brain in every part is often found harder than natural after malignant fevers. This, Dr. Clutterbuck remarks, we know to be a common effect of inflammation in other parts. (Inquiry into the Heat and Nature of Fever, part i. p. 173.) The writer of this article lately witnessed an unusual firmness of the brain of a patient, dead of putrid fever, but the brain of the abdominal vifera had already become very putrid. The congestion in the brain was very considerable. Not only, however, are these congestions and inflammatory phenomena of the brain frequently absent, but sometimes together with them, and not seldom in their absence, similar appearances are observed in other vifera, more especially in those of the abdomen. Dr. D. Munro included other organs with the brain in his mention of the morbid changes produced by fever: and Sir John Pringle remarks, that when contagious fever proves fatal, it generally terminates either in the actual mortification of some part, or in an abscess of the brain: and he adds, that "the intestines more particularly are disposed to mortify." He likewise quotes the Trait de la Pelle, to prove that some of the vifera were always mortifid and inflamed, the brain and lungs most frequently, in those who died of the plague at Marcellia. Dr. Etiolfe, continuing his description of the appearances discovered by the dissection of those who died of the Lepide fever, says, "the lungs were often found deliroied, inflamed, ulcerated, gangrenous, covered with much exuded lymph. The liver inflamed (especially the concave surface) tender, fucid, full of blood, or pale and bloodless. I did meet with inflammation and gangrene of the uterus, the urinary bladder, the prostate and other glands (particularly the mениsicus) of the colon and rectum." "The pains in the head were sometimes so violent, and the delirium so furious, as to indicate inflammation of the encephalon, which however was discovered in the abdomen." In three dissections of persons cut off by an epidemic fever in Normandy, Dr. Monnet found the vifera of the brain and its membranes gorged with dark blood; the lungs were also diseased; all the ramifications of the mениsicus arteries full of black congealed blood; the intestines in part inflamed, in part putrid and gangrenous, in two of the cases a prodigious congestion in the small curvature of the fomach and in all the intestines, especially the small. Of the fever which raged at Leghorn, in the summer of 1804, Thiebault reports, "that there were few of the vifera which it did not leave sometimes found, sometimes gangrenous, or at least with black spots on the surface. This alteration was especially seen on the concave part of the liver, the inner surface of the fomach and intestines, often in the right side of the lungs and diaphragm; the abdominal vifera, and still more the abdominal muscles, were excessively flabby and tender. The cavities of the thorax and abdomen, the pericardium and the ventricles of the brain, contained a yellow liquid, often fucid, and of a dark bloody tinge. The superficial vifera of the vifera, especially those of the brain and intestines, appeared dilated, and their extremities filled with a black matter. Nothing was found constant but the gangrenous nature of the alterations, and their being more concentrated on the fomach and intestines than in the other vifera." (Recueil, period xxxiii. 12-13.) Palloni (Offervaz. Med. Livorno, 1804.) gives a very similar account. In his dissections, the force of dissection still more plainly appears to have been exerted upon the abdominal and contiguous vifera. During the similar epidemic of 1802, in Spain, professors Sabater and Ramos found in the abdominal vifera fanious and purulent effusion with gangrene. It is expressly said that, in the two other great cavities, the head and the thorax, essential changes were seldom found. In some subjects, however, black gangrenous points appeared upon the lungs, and in others upon the brain. "The alterations in the abdominal vifera were the only ones that can be considered as the direct and immediate product of the disease." (Berthe, Precis de la Maladie d'Andaloufe, 1822, p. 182, & 6.) Dr. St. Bury's, both fesuation to the Philadelphian diphtery, informs us, in his dissection on malignant fever, (1834.) that the brain was generally found in a dilated state, the membranes being considerably inflamed, the dura mater being sometimes aggutuated to the pia mater, the blood-veils turgid with blood as if injected, the brain firmer than usual, wateer frequently in the ventricles, and sometimes blood effused between the membranes. The fomach was always diseased; great inflammation observable throughout: erosions of the villous coat frequent; inflammation extending to the intestines; bladder diseased; liver, fleshy, putrid, kidneys generally found; lungs puffed, inflamed, and heart inflamed." We quote these observations from Dr. Beddoes's researches, not having the original works. We add, that in two cases which we lately investigated by dissections,
dissection, the villous coat of the small intestines was ulcerated in parts, and altogether destroyed in others; the brain at the same time bore marks of great congestion in the one case, and its ventricles were much distended with serum in the other.

We have dilated upon the subject of the morbid structure occasioned by fever, (which must ever be deemed highly important,) because it is too much neglected, partly from a mistaken fear of contagion from the dead body, which deterred even Morgagni from such investigation; and partly from preconceived hypothesis, which has led to the examination of only one cavity of the body, when diffuse might be discovered in all.

Ratio symptomatum, or explanation of the Symptoms.—

The first symptoms of every fever obviously indicate a diminution of the nervous power. Of the nature of this power we only know that it originates in the brain, and is communicated to every part of the animal frame by the medium of the nerves; and that the action of those parts, their motion and sensibility, depend upon this communication. The first symptoms of fever, then, indicate that loss of this nervous power is produced and imparted to the organs of the system; or, to use a common expression on this occasion, that there is a torpor or atomic condition of the brain and nerves. This is shewn by the languor and latitude, connected with the relaxation of the muscles. A similar condition is produced by the depressive passions, acting through the medium of the mind on the nervous power; whence the whole body becomes relaxed, as is shewn by the lengthened muscles of the face, the loss of strength, &c., and if the muscles of the heart are also relaxed, fainting is produced. The depression of strength depends upon the same cause; the muscles being unable to move the body with the usual force, and the powers of the mind being impaired. The muscular energy and powers of the mind are much connected in the animal economy; so that if the body have been fatigued, they will not exert its powers of attention, memory, and judgment with alacrity, or even with much force. A fact in mathematics would be unable to trace the steps of an intricate problem, after having contended in an athletic game; or, on the other hand, after having fatigued the mind by going through a new and laborious demonstration, he would be unable to exert the powers of his body in a fox chase. We cannot think much, and use strong exercise at the same moment. Both these powers, therefore, seem to depend alike on the nervous energy, and the simultaneous diminution of both implies the diminished state of that energy. Yet this is different from ordinary debility, and has therefore been distinguished by the term depression of strength; the powers of the body not being lost, but only prevented from acting by the disease; for if the disease ceases in eight or ten hours, (as in the paroxysm of an intermittent,) the depression of strength ceases likewise, and both the body and mind can exert themselves with a vigour nearly equal to that which they possessed before the disease began, or in perfect health. The nervous power is diminished, 'like the action of a spring, which is overcome by the temporary pressure of a weight, that does not destroy its elasticity.' Another result of the muscular relaxation is the feeble action of the heart, on which many of the symptoms depend. This is evinced by the feeble, small pulse, by its occasional irregularity, and even flowlessness, at the onset of the fever. This languor of the circulation, especially in the extreme vessels, is the cause of the palefia of the skin, and the shrinking and diminution of size in the features, and every other external part, as well as of moth'd swellings. The condition of the surface is the same, to all appearance, as is produced by the application of external cold, which constricts, or rather diminishes the action of, the small superficial vessels; whence the cutis aspera, or goose-skin contraction and roughness of the surface takes place. Whence also the skin is dry, at the same time, as perspiration cannot be produced from vessels in which the circulation is nearly suspended. It must be observed, however, that the action of the capillary vessels of the skin is not entirely regulated by the action of the heart and great arteries; for the former are sometimes dilated quickly, as in the blush of flame, or collapsed, as from external chill, when the pulse remains unchanged. From the same cause, (the languor of the circulation, and the contracted condition of the extremities of the arteries,) the other secrétions are diminished. The mouth and tongue become dry from the scanty supply of saliva; the pancreatic juice, the bile, the mucous and serous excretions in the alimentary canal being diminished, as well as the muscular actions of the bowels coiled, the faces are not puffed forward, and capillare andas place; the urine is not only small in quantity, but of pale colour, from the diminution of the saline and mucilaginous animal matter, which are secreted by the kidneys in health, and give it its peculiar colour. From the same imperfect circulation the discharges from the skin and ulcers cease in the attack of fever.

Until we obtain a more accurate knowledge of the origin and nature of animal heat, and of the means by which it is maintained at the regular temperature of $97\frac{1}{2}$ or 98°, notwithstanding the varieties of the atmospheric temperature in which we live, we shall not be able to explain satisfactorily the changes which the heat of the body undergoes during the different stages of fever. We know, however, that the variations of the heat are much connected with the functions of respiration and circulation. In what are called cold-blooded animals, the function of breathing is performed at long intervals, and is capable of great suspension without injury to life; and general coldness better than heat is the physiologic action of the blood is diverted from the lungs, as when the facial organization of the heart remains in after life. With the circulation the connection of animal heat is so well known, that, in popular language, redness, or a florid colour of the skin, (which arises from its vessels being dilated with blood,) is almost synonymous with heat. In all influences of acute inflammation the sense of heat is in a great measure proportionate to the vascularity and redness of the part affected. At the onset of fever, then, both the actual cold and sense of cold are doublets of the effect of diminished circulation on the surface, which is somewhat augmented, perhaps, by the imperfect respiration which is then carried on. It is not so easy to explain satisfactorily the sensibility of cold existing, when to the feel of another person the heat is natural. This may be attributed partly, perhaps, to the state of torpor in the brain, partly to the disordered condition of the sensitive extremities of the nerves, and partly to the actual chill, which remains in particular parts, while others have become warm. The sensibility of the organs in general, we have said, is impaired, and the sensations are occasionally not only diminished, but deprived. This also arises principally from the deficient circulation in the extremities of the arterial system. Sensibility is greatly dependent upon a sufficient circulation of arterial blood to the extremities of the nerves, as well as to the brain. Those parts of the body through which red blood does not flow are pœnified of little or no feeling; such are the cuticle, the nails, hair, tendons, &c. While, on the contrary, parts that are extremely vascular, as the true skin, are endowed with acute sensibility.

Again,
FEVER.

Again, the increased flow of blood to any part is generally attended with increase of the sensibility of the part; whence the augmented sensibility, the foreheads and tendernefs of parts that are inflamed. Hence, then, we may explain the diminished and depraved sensibility of the skin, and organs of fente, in the cold flague of fever. Even the turpor of the brain itself is increafed, and therefore partly to be accounted for by the weakened circulation in it, at that period of fever, and is probably, in many cases, a secondary effect.

To the enfeebled circulation also, much of the anxiety, and fente of load about the region of the heart, the fighing, yawning, and stretching of the limbs, is to be attributed, as well as the short and disturbed respiration. The force of the heart being unable to propel the blood to the extremities of the arteries on the surface, a greater quantity must be accumulated in the great veifs about the heart and in the lungs; whence the load and oppreffion, the labour and irregularity of respiration; whence also the fighing and yawning, which are a fort of inftinctive action, by which we dilate the lungs, give a fierer paffage to the blood, and therefore relieve, for a time, the uneasy fentiment. According to Dr. Fordyce, indeed, this fentiment has been proved by difection. "In thofe difeafes," he fays, "which have been made of patients, who have died in the attack of simple fever, the large veins going to the heart, that is, the vena cava, both fuperior and inferior, the right auricle of the heart, and the pulmonary arteries, have been found difted with blood, to a much greater degree than they are commonly, when death takes place from other caufes." (Firft Differt. p. 92.) Sometimes a cough attends the cold flague of fever, arising from the irritafion of this accumulated blood in the thorax.

The hifligfnefs and general uneafinefs which are at the fame time present, are almost the necefsary confequence of thofe morbid conditions of the fenfium, of the circulation, of the breathing, and of the muscles of all parts. Uneafy feelings lead us inftinctively to fearch in frequent changes of poffure. Besides thofe uneafy feelings, however, there are head-aches, and pains in the back and the limbs, which have been differently explained by different physicians. Some have ascribed the head-ache to the flate of the brain in the cold flague of fever, but erroneously, in the opinion of Dr. Fordyce, fince, whether it occupy the forehead over the eyes, or the back part of the head, it is equally external to the fenfations of the patient. In like manner, the fpinal marrow, as it is improperly called, being a continuation of the fubftance of the brain through the tube of the fpine, has been confidered as the seat of the pain of the small of the back which commonly occurs. (See Clutterbuck on Fever.) But why it should occur only in that part of the back, and not along the whole fpine, it might be difficult to explain: while, on the other hand, if it were an affection of the great muscles of the limbs, and it very much resembfes the pain of weaknefs and fatigue,) it fhould, like this pain, be greatly benefited by the horizontal poffure; which, indeed, we believe to be the fact, notwithstanding the affection of Dr. Fordyce. And the occurrence of fimilar dull pains in all the limbs renders it probable that it is chiefly muscular, and connected with a deficiency of nervous energy, as in muscles which have been exhaufled by fatigue.

The affection of the fluxom, indicated by the fift of appetic, feekefs, thirst, and food terrene, home or all of which are among the symptoms of the febrile attack, may not be fo capable of a fatisfactory explanation. It might be obferved, however, that there are at leaft three fources of arrange-ment to this organ in the cold flague of fever; namely, the state of the muscular fibres of the fluxom and of its fecretions, which suffer in common with the other muscles and fecretions of the body; the great fympathy which exists between the fluxom and the brain; and, above all, perhaps, the intimate fympathy of the fluxom and the skin. It femei demoniftd, from the effects of flimulant and tonic fubfiances in augmenting the appetite for food, and the power of digestion, that a certain vigour of the muscular part of the fluxom is neceffary to, and co-exifls with, the proper exerfice of thefe functions; and, therefore, that a re- laxation and defility of the fame part must be the caufe of a diminution of them. Observation also has taught us, that when the muscles are exhaufled by exercise, the fluxom partakes of the fatigue, and the appetite and digefive power are greatly impaired or loft. The influence of a morbid condition of the brain on the fluxom, by fympathy, is well known to be great, infomuch that some writers have confidered this influence as amply fufficient to account for the diforder of the fluxom in fever. Both in inflamation of the brain, and in the cafe of external injuries of the head, ficknefs and vomiting are among the moft invariable symptoms. Dr. Clutterbuck remarks, that the fluxom not only receives nerves from the great intereoral nerve, but a|lo communicates directly with the brain, by means of the eighth pair of nerves, or por vagum. Hence he adds, "it is little to be wondered at, that the functions of the fluxom in fever, and the fummonus of the other organs of the body, should fuffer a deviation from the natural flate. In this way the uneasy fenfation often felt at the pit of the fluxom in fever, the total want of appetite, the loathing and difgust commonly experienced even at the fight of food, are naturally and easily accounted for." (Loc. cit. p. 74.)

Dr. Cullen, on the other hand, is difposed to confider the flate of the skin as the principal occafion of the affection of the fluxom, in confequence of the fympathy between the two organs. The fym pathetic influence of the flate of the skin in inducing diforder of the fluxom is fupported by a curious fact obferved by Sydenham in the plague. In the attack of that difeafe, he remarked, that vomiting occurred, which prevented both food and medicine from remaining on the fluxom; and that the means by which he was enabled to alay this fymptom, was inducing perfpiration by the aid of external covering; as foon as the skin became moift, the ficknefs diminished, and the loathing and miseries were then retained. (Sydenham, Op. fecl. ii. cap. 1.) We fhall hereafter remark the occurrence of the hot flage generally removes the vomiting, that of the sweating flage always.

This doctrine is ftilI further supported by a confideration of the origin and removal of the triflis, which occurs at the onfet of fever. The fentation of triflis doubtleslly arifes from different caufes, and under different circumftances, the mere drynefs of the mouth and fenes, from evaporation of the moisture, in confequence of the heated breath, or from deficient fecretion, may be attended with that fenfation; uncommonly it feme to be excited by a peculiar occafion of the fluxom, while the mouth and fenes remain moift, as appears from the third which arise from falted food in the fluxom, or food of difficult digefion, or too great in quantity; or, as Dr. Fordyce fashion, it feme to be fometimes occafioned by a diminished proportion of water in the blood-cells; as, in the cafe of diabetes, when the kidney is made up to a fuperior activity or excretion, and a great defcance of fluids by perfpiration. The author, however, confiders the matter as not capable of being determined, (see his Firft Differt. p. 223.) although he is difposed to refer it to a particular affection of the fluxom. (Ibid. p. 80.) This opinion, we think, is scarcely to be questioned for a
moment; since thirst often occurs in fever, when the tongue and fauces are moist, and generally before any diminution of the watery part of the blood has taken place. But several circumstances condense to prove an intimate connection between this affection of the stomach, which occasions the fastation of thirst, and the state of the skin. It has been found by seamen, when accidentally deprived of drink, (as by lieutenant Bligh, and his men, in their miserable voyage in the South sea,) that by immersing the body in water, or applying wet clothes to the skin, the thirst has been relieved. Dr. Currie relates the case of a gentleman, who was prevented from taking any substance, solid or fluid, into the stomach, in consequence of an obstruction in the esophagus. In the first days of his abdomen the fastation of thirst was very troublesome; but it abated, and, as he declared, was always removed by immersion in the tepid bath. (Med. Reports on Water, etc. p. 275.)

The same author has stated from numerous experiments, that the thirst, which continues in the hot stage of fever, is almost instantaneously removed by the application of cold water on the skin, which at the same time induces perspiration, and relieves the febrile paroxysm. (See Cott.) On the contrary, the swallowing of cold drink, in the hot stage of fever, which relieves the thirst, is often followed by a relaxation of the perforatory vessels of the skin; and, when cold, drink does not produce a sensible increase of circulation in the skin, the influence which it affords to the thirst is momentary only; which evidently proves the reciprocal sympathy of the organs. (Currie, loc. cit. 178.) And this is farther proved, as we have already stated, by the cessation of thirst when the sweating stage of fever is established.

All the symptoms, then, of the onset of fever, constituting the phenomena of the cold stage, are explicable, directly or indirectly, on the supposition of a depression or diminution of the nervous energy, however induced. In like manner, the symptoms of the hot stage and the subfequent phenomena, in continued fevers, are referable to an imperfect recovery, as it were, of the nervous power, and more immediately to the increased action of the heart and arteries, and of the capillary vessels.

The heat, the redness of skin, and flushed countenance, the returning size of the external parts, the restoration or even increase of the sensibility of the organs, are all the result of the diuresis of the extreme vessels by the hot blood, as the opposite symptoms of the cold stage were the consequence of an opposite condition of the circulation. Hence the frequent fevers of the body, which cannot bear its own pressure without pain; hence intolerance of light in the eye, and the quick sensibility to noise in the ear, both of which increase the head-ache, which is now more acute, and deep-seated: hence also defeased parts become more painful. The quick, and strong pulse, implies the greater force of the heart, and of the arterial action; nevertheless the dryness of the skin, and the continued suppression of the rest of the secretions, evince the continuance of a morbid condition (a constitution or poison, it has been called) of the extremities of the exhalent and secretory arteries, by which their functions are impeded. This condition bears a considerable analogy to the state of inflammation, (see Inflammation,) and when this stage of fever, and these particular symptoms are very fevers, the fever has been called inflammatory fever.

Connected with, and in a great measure the result of this morbid condition of the circulation in the brain, is the delirium, which, though it occasionally occurs in the cold stage, is usually absent until the hot stage has been formed. It is often accompanied by a throbbing or strong beating of the carotid and temporal arteries, redness of the eyes, and flushed countenance, which give us reason to believe that it arises from over-excitement of the brain, by the quantity of blood thrown up into it by the increased action of the heart. In this state the ideas crowd themselves, as it were, upon the attention of the patient, and change rapidly from subject to subject; he is unable to court the records of sleep, in consequence of the torrent of images which are presented to the mind. The condition of the brain appears to be similar to that of the whole of the sentient parts: as the eye is more acutely sensible to the impression of light, and the skin to that of touch; so the brain or the sensorium is more easily excited to thought, by the impressions of internal irritation, which are exceedingly multiplied in this state of fever. Hence the incessant dreaming which distresses the patient, if he falls into an imperfect sleep; and as the internal feelings are all of a painful nature, whether we consider the anxiety, the head-ache, the pain of the back and limbs, or general uneasiness, &c. the dreaming ideas, which are associated with these feelings, are also a painful and disturbing nature. (See Dream, in Pathology.) If this increased action of the vessels of the brain continues, a degree of prefire is apparently produced by a more permanent diffusion of them, and a fever and deadness come on. If the patient die in this state, a general congestion of the vessels of the brain is found upon dissection; but the mere active delirium, unattended by fever and deadness, may even prove fatal, yet no traces of the morbid condition of the vessels of the brain shall be discoverable after death. (Forbyee, Third Diff. 1. p. 99. 109.) In these cases, it sometimes happens that the delirium ceases some hours previous to death, although the other symptoms of fever continue. This obviously arises from the linking powers of the circulation; whence the action of the arteries of the head is reduced to something approaching to the natural state, before it ceases altogether with death. Delirium is occasionally connected, it is supposed, with an enfeebled action of the vessels of the brain; in which case it affinmes another form, is not accompanied with any violence, but with great feebleness, and a low muttering rather than a hoarse noise. It is the delirium mone of authors. (See Delirium.) We believe, however, that even this low delirium is commonly the result of some degree of congestion of the vessels of the brain, arising from local inequality of the arterial action, although that action may not be violent. The sweating, like the dry heat of the second stage, is produced in a manner not very well understood. It was supposed by the older physiologists, as by Albanius, Haller, &c. that the sweat, as well as the insensible perspiration, is a mere exudation of the watery part of the blood through the cuticle: hence it was said to arise, in fever, from a mechanical relaxation of the extreme arteries, which were supposed to be spasmodically contracted during the hot stage. But it has been observed, by later physiologists, that this opinion respecting the nature of the perspiration is contrary to all analogy, and founded only upon experiments made on the dead body. The opinion of Dr. Forbyee and Mr. Cruickshanks appears to be the true one: namely, that the matter of perspiration is secreted from the blood by the capillary arteries, and thrown out on the surface by organic pores in the cuticle, (however difficult to be discovered,) connected with the extremities of these arteries; and that in this process there is not a separation merely, but a new combination, as in similar influences of secretion. (See Dr. Currie, loc. cit. p. 200.) Although, therefore, the occurrence of perspiration has been considered as the cause of the cessation or diminution of the symptoms of fever, (and certainly
certainly no such change takes place without some appearance of moisture on the skin, yet it is probably only one of the signs or effects of that affection, in common with the reiteration of the other secretions, which are also diminished or suspended in the attack of fever. This point, however, seems to be ascertained, that the process of perspirations is a cooling process, and the principal means by which the overheating of the body is prevented or removed. The heat of fever declines gradually, as the perspiration goes on; but the rapidity with which it declines is varied by the quantity of bed-clothes, and the degrees with which the body is enveloped. While perspiration goes on, it is difficult to raise the temperature of the body above the natural standard, and under such circumstances it is capable of bearing very extraordinary degrees of heat, as was proved by the experiments of Sir Charles Blagden, Dr. Forsythe, and others. Whether the refrigerating effect of sweating depends solely on the evaporation, or whether an absorption of heat takes place in the process of the secretion of perspirable matter, is not certain.

The turbid urine, throwing down a sediment of a lateritious or brick-dust appearance, arises from the reiteration of the secretion of the kidneys, which now separate the lithic acid, as well as the animal extractive matter, in greater quantities than in health; but the urine contains, at these times, only a super-abundance of those substances which it contains in a state of health, there being no new or morbid matter produced in it. This change in the urine has been likewise explained upon the supposition of a spasm in the secreting arteries in the kidneys, which suffered only the thinner parts to pass, or pale urine, in the first stages of fever; but being relaxed in the sweating stages, the thicker parts were allowed to pass, and thus occasioned the sediment. But the kidneys, like the other secreting organs, are not mere vesicles, nor are those thicker parts existing in the blood, previous to the commencement of the sweating stage; they are then produced by the action of the kidneys. There is, however, an intimate connection of sympathy between the action of the perspiratory vessels of the skin, and the secretion of this over-proportion of lithic acid, and animal mucilage by the kidneys: for it is generally producible at pleasure by a dose of Dover's powder, or other sudorific medicine.

The symptoms, which occur in the later periods of fever, when it goes on to a fever or fatal degree, are explicable as the effects of an extreme prostration of strength. Hence the tremors, and slight convulsive motions, or furtulent, of the tendons and muscles; hence also the irregular vision, with the appearances of little bodies flying before the eyes, (microscopically on the retina, or nervous membrane of the eye; hence the general indigestibility, the difficulty and labour of respiration, the involuntary discharge of stools and urine, the difficulty of swallowing, &c;)

The regular periods at which the paroxysms of intermitting fevers, and the exacerbations of remitting, and even of continued fevers, return, require some notice, although a satisfactory explanation may not be attainable. The fact has been generally referred to the influence of habit, which is productive of many phenomena in the animal economy. (See Habit.) It is observable, that all men, even in a state of good health, have a sort of febrile condition introduced in the evening, which goes off in the morning: there is some depression of strength or dizziness both of body and mind, and the pulse is quicker than in the morning. In proportion as the health is more delicate, this state is more evident. It is probable that this diurnal paroxysm is to be attributed to the effect of the irritations of the day, which are suspended during the night; and this diurnal habit might be sufficient to account for the usual evening exacerbation of continued fever. A similar diurnal habit is likewise observable in many of our actions and functions; as in the returns of sleep and waking, and of our appetites and excursions, which, if prevented from taking place, or being gratified at the accustomed period, are apt to cease or become less urgent. This is often remarked with respect to the desire of sleep, to hunger, and to evacuation of the bowels. These facts might afford an analogous explanation of the periodical returns of intermittent fevers, if they were all supposititious; but they afford us little assistance in accounting for the return of the paroxysm of those fevers at the end of forty-eight hours, in the case of tertian, or of fifty-two, in the case of quartan fevers. But it is remarked by Dr. Cullen, that even those dilatant paroxysms are in some degree connected with the diurnal revolution, as the times of their accession are generally fixed to one time of the day; so that quotidian come on in the morning, tertian at noon, and quartans in the afternoon. (First Lines, § lvi.) Some writers have attributed all these periods to the habit, but as the second and third paroxysms of a tertian occur as regularly, often more so, at the end of forty-eight hours, than the seventh and eighth, habit could not be the cause of the return in the former inexpressions, whatever might be supposed with respect to the latter. On the whole, we can only conclude that a disposition to these periodical changes is a general fact in the animal economy. See Periods of Disease; also Catenation.

General Prognostics in Fevers.—In continued fevers the event cannot be prognosticated with any approach to certainty. The dilatation is in its nature of a dangerous tendency; and although there shall be no unfavourable symptom for the first seven or eight days, yet the fever may afterwards assume a dangerous character, and terminate fatally: while, on the other hand, recoveries occasionally take place, when the severity of the symptoms seemed to preclude all hope. A large proportion of the cases of fever, however, if properly treated, terminate favourably. Under the various forms which fever purports on, we can arrive at a correct notion of the probable termination of each particular instance, by taking a comprehensive view of the living machine; by estimating the relative importance of the several organs and their functions, in the maintenance of life; and, therefore, by observing accurately the number of these, which are affected by the disease, and the degree in which they are deranged; and we must further take into the consideration the species or type of the fever, its general tendency, as well as the particular tendency of the prevailing epidemic; and likewise the peculiar circumstances of the patient, in respect to age, constitution, previous habit of body, mode of life, &c.

The prognostics of a favourable termination is deduced principally from the lesser degree of violence in the symptoms in general, or the smaller number of those which are fever; and likewise from several changes in the course of the disease, which experience has ascertained to be salutary.

Favourable Symptoms.—If the foetidus continues unaffected until the middle of the second week, and a delirium moderate in degree should then come on, it is not unfavourable; it implies a moderate affection of the brain. Deafness is most commonly a favourable symptom in this country; it implies, indeed, a morbid condition of the brain, but one which experience has proved to be free from the danger which attends the opposite condition.
FEVER.

The symptoms of a failure of the vital powers, however, which are more common in the fevers of this country, are less under the control of medicines, and therefore more dangerous; and moreover especially when conjoined with a congestion, or low degree of inflammation, in any of the important fevers. We shall note these symptoms of failure of the *sir upa* vis, as they are connected with, and exhibited by, the disordered state of the functions of the leading organs. It has been stated, under a former article, that death is always occasioned by an interruption of the functions of the brain, of the heart, of the lungs (see Death); and accordingly the symptoms which occur in the functions of the meninges, and in the circulation, and respiration, in fevers, are those which mark the greatest degree of danger.

The defect of energy in the senorial functions is indicated by the extreme muscular debility; or prostration of strength, in the latter periods of continued fevers. Thus, if the patient is unable to support himself on either side in bed, but falls back into the same position by the influence of gravity; or the bed, a dangerous debility is indicated. Tremors of the hands, (as well as of the tongue, when protruded,) and of other parts, which with a slight increase pass to subfutus or flattening of the tendons, and these again into convulsions, are bad symptoms, as they imply an imperfect and irregular distribution of the nervous influence from the brain. After the tremors and subfutus tendinum patients frequently recover; but rarely, if ever, when convulsions supervene. Sir John Pringle remarked, that a tremor of the hands in the beginning of fever was one of the most constant signs of that fever being of a typhous nature. (Loc. cit. part iii. chap. 7. § 2.) When the diaphragm is affected (palmodically), giving rise to hiccup, it is a fatal symptom; as it is likewise the relaxation of the sphincter muscles of the bladder and the straight gut, (rectum,) which allows the urine and the feces to pass involuntarily, and which marks an extreme degree of debility. And when the muscles of the gullet, and those of respiration, become so far enfeebled, that the act of deglutition becomes difficult or impracticable, and the act of breathing is short and very labored; that is, generally, to be considered as near at hand. The foaming at the mouth, and the rattling noise in the throat, which is called by nurses the dead-crotches, are the first more immediate precursors of death; and are occasioned by air of respiration passing through the mucous and saliva, collected in the mouth and throat from total inability of swallowing it. Other unfavourable symptoms, indicating the deficiency of the nervous power, are found in the different degrees of slumber and delirium, which are more indicative of danger, in proportion as they appear earlier in the disease; but which often occur, nevertheless, to a very confiderable extent, in cases which terminate well: so that we must take the other symptoms into consideration before we decide upon the danger of these. Dr. Fordyce has stated, that "although the patient should be insensible to all external objects, though he should sleep very little, or scarcely at all; yet, if the deglutition and respiration should remain unimpeded, the patient is not to be despairs of; it happens most commonly that he recovers. But if he respirs with great difficulty or hardly at all, or if the deglutition be almost totally prevented, or if attempting it throws the patient into convulsive
convulsive contractions, he rarely recovers." (Third Differt on Fever, part i. p. 111.) Nevertheless, he judiciously estimated the unusual continuance or increase of delirium as a dangerous symptom; for, "on the other hand," he adds, "if the other febrile appearances do not keep pace with the delirium; though the pulse should become more quick and less obstructed; though the tongue should become cleaner and softer; though the colour of the skin should become more natural, the secretory veins more relaxed; if, however, the delirium should still continue, without fever or pulse-feeling, and the other marks which have been pointed out as accompanying fulness of the vessels of the brain; in such case, notwithstanding the practitioner and bystanders are flattered, the patient is frequently cut off." (Ibid.) The more active delirium is often accompanied with an inflammatory condition of the brain, even in fevers arising from contagion, in which the other organs evince a defect of power, and the rest of the symptoms are also indicative of great debility: this combination of a local inflammatory action with general defect of power, whether it be considered as implying an inequality of the distribution of nervous influence, or be explained by any other hypothesis, is invariably dangerous, in whatever organ the inflammatory action takes place, but particularly when it is in the brain. It is necissarily embarrassing to the physician, and difficult to treat successfully, from the opposite nature of the remedies required for the suppression of the local inflammation, and of the general prostration of strength; the nature of the one affections absolutely contra-indicating the treatment, which the nature of the other as decidedly requires. Connected with the defect of senofinal power, the absence of thirst, while the tongue and mouth continue exceedingly dry and parched, is deemed an unfavourable symptom; and a delirious patient fancying himself well, is equally unfavourable, as implying a great obtuseness of the sensibilities.

In respect to the circulation, all unusual perturbation in the action of the heart and arteries is in some degree unfavourable; but especially extreme frequency and freckles of the pulse, and irregularity. When the pulse beats above 120 times in a minute, or more, in fever, it must be considered as an unfavourable symptom; when it reaches 150, or upwards, the prognosis is extremely unfavourable. Although in some fevers, as in hydrocelephus, the pulse has been counted at upwards of 200 beats in a minute; yet, in fever, before it comes to 150, it is generally too incul and feebie to be counted at the wrist, and the pulse is then to be considered as adequate; the pulse, indeed, has sometimes been so obtuse as not to be felt at the wrist, for a day or two before death, when it might be felt at the temples, or in the axilla. In this state, the extremities are generally cold, which is another fatal symptom, when combined with those before-mentioned. Sometimes, from an irregularity in the action of the heart, the pulse intermits. An intermitting pulse, according to Dr. Forید's opinion, "is always a very dangerous symptom, excepting where it also took place when the patient was in health, and before the disease arose; but in the attack it is particularly hazardous." (First Differt. p. 85.) It is certain, however, that an intermitting pulse occurs in some cases along with favourable symptoms; we have seen it in a few cases, and only under such circumstances, in all of which recovery took place. It is remarked by Dr. Gregory, the present professor of physic at Edinburgh, that when the intermission is connected with an obscenity or indignation of the pulse, and the other parts of the face, are also among the unfavourable symptoms, as implying great irregularity of the circulation.

Great derangements of the respiration, whether such as denote a degree of inflammation in the lungs, (constituting the pneumonia typhodes of authors) which, from the contra-indications already mentioned, is extremely difficult and embarrassing to the practitioner, or such as denote the failure of the muscular powers, before alluded to, are always extremely unfavourable symptoms.

Deficiency of the nervous or vital power is farther indicated by the effusions of blood which take place from the extremities of the arteries under the skin, forming the petechiae, ecchymoses, and blotchtes, before described. These are always symptoms of a fever diseased, but far from being mortal. The larger they are, and the nearer they approach to purple in their colour, the more they are to be dreaded. (Pringle, loc. cit.) Dr. Huxham observes, that "when black, livid, dun, or greenish spots appear, no one doubts the malignity; the more florid, however, the spots are, the less is to be feared; it is a good sign when the black or violet petechiae become of a brighter colour. The large black or livid spots are almost always attended with profuse hemorrhages. The small dusky brown spots, like freckles, are not much less dangerous, than the livid and black; though fluxes of blood do but seldom accompany them. The violets, or large livid or dark greenish marks, seldom appear till very near the fatal period." (Loc. cit. chap. viii.) The petechial hemorrhages mark a greater degree of the same condition of the fluids and fluids. Black and very fetid fluids are bad, as indicating a strong putrefactive tendency of the bile and forbes in the bowels, and as arising from blood effused into the canal. The urine sometimes deposits a black and fetid sediment, which conffits of effused blood, and is equally unfavourable. Thee, together with the black fur which collects about the teeth and mouth, the fetid breath, the disposition to gangrene in parts inflamed by blisters, or by the preasure of the body in bed, the loose texture, and black colour of the blood, &c., are the symptoms, which have been considered as denoting a patrid condition of the fluids in these forms of fever. It cannot be questioned, that there is often a putrescent tendency in the circulating fluids and in the fluids, so that they readily undergo the process of putrefaction, when discharged or after death; but it is well ascertained, and has been confirmed by direct experiments, that an actually putrid state of the finalized portion of the circulating fluids is incompatible with life. It is sufficient, however, to know that these symptoms denote great danger, or a great tendency to death, and to have learnt from experience, the remedies which contribute to remove the symptoms, and to counteract that tendency.

The changes which take place in the urine were formerly much attended to, and although not so much is to be learnt from its appearances, respecting the nature and progress of the fever, as was once supposed, nevertheless this excitation ought not to be neglected by the practitioner. It is an unfavourable symptom when the urine, after having been turbid, becomes again pale and limpid; as it implies a return of the torpor or contraction of the extreme vessels, i.e. a renewal of the febrile attack, and is therefore commonly followed by other bad symptoms, as by delirium, congestions in different organs, &c. Incontinence of urine, whether dependent on a laxity or paralytic state of the sphincter muscle of the bladder, or whether the urine is expelled involuntarily from a tumor or indulgence of the patient, is always unfavourable; if this is overlooked, excretions are apt to take place from the patient lying wet, whence inflammation.
inflammation and sometimes gangrene arise. A difficulty in distilling the urine, or palping it frequently in small quantities, indicate considerable irritation and congestion of the bladder, and are therefore bad symptoms: a suppression of urine may be considered as one of the worst symptoms of fever. When the urine exudes an offensive odour, or is black in its colour, especially when containing the black or bloody sediment before mentioned, it indicates a state of the body which is dangerous. Even the ordinary healthy appearance of the urine, combined with symptoms of severe fever, is considered as indicating an unfavourable state. (See Lommius, Medicinal Observ. lib. 1. p. 5.)

Vomiting, especially of blood, or of matters of bad colour and smell, is a symptom of extreme danger. Obstructive colliensives in the latter stage of fever, which is generally accompanied with feverish headache, is very unfavourable. It seems to imply great torpor in the bowels, in consequence of the affection of the nervous system. Diarrhœa, in the late periods of fever, is generally unfavourable, especially when the feces are liquid, and at the same time very pale, or black, and fetid: the pale colour implying the absence of the bile and proper fluids of the intestines; the black and fetid condition indicating a corrupted state of the bile and other secretions, or a mixture of blood, and a putrefactive tendency of the whole contents of the bowels. A more copious discharge of unmixed blood from the intestines is a dangerous symptom; if hiccup or convulsions follow it, death generally soon ensues. This condition of the bowels seems to arise in many cases from a neglect of opening them, or removing the fords in the beginning. A great dilution of the abdomen, or of the epigastric region, arising from flatus, which the stomach and intestines have not sufficient power to expel, is often among the late and fatal symptoms of fever.

The changes of the countenance afford very important indications in respect to the severity and probable event of the disease. With a small share of experience, indeed, any person will recognize fever, from inspection of the countenance alone: and the disease never advances to a dangerous state without being accompanied by proportionate alterations in the features. In extreme debility, the eyes are often sunk or collapsed; sometimes they remain fixed and unmoved, which state is connected with the coma and stupor; and occasionally arises from a spasm of the muscles of the eye-ball, in which case they are also sometimes prominent; at other times there is a constant rolling of the eyes, which is often connected with delirium; or there is a distortion, or fquint, which commonly implies some pressure or other affection of the optic nerves. All these are of course unfavourable symptoms; as is also that curious defect of vision, from impaired sensibility of the retina, which gives rise to the appearance of mufaee volatantes. When the white part of the eye is principally seen, the pupil being turned upwards, and the upper eye-lid a little let down, it is unfavourable, as implying a spasmodic contraction of the muscles of the eye-ball, and great relaxation in those of the eye-lid. The prognosis is also bad, when a fog of film is formed over the eye, or mucus collects within the eye-lids, on their edges, or at the angles of the eye, or when the cornea is red; or when one eye seems larger than the other, implying irregular motion of the muscles. Any distortion of the features is a bad symptom, for the same reason, indicating the great affection of the functions of the senilium.

Great redness, a constant motion of the arms, uncovering the balsam, or the arms and legs, which nevertheless are not hot, picking at the bed-clothes, as if to catch flies or insects, grinding the teeth, (which is a spasmodic affection of the muscles of the lower jaw,) are all symptoms of considerable danger, as indicating great derangement of the nervous system. The changes of the voice, as connected with debility of the muscles of respiration, as well as of the lesser muscles of the larynx, are also unfavourable signs. The tone and articulation are thus variously altered, and the thick black crust and fur which collect on the tongue and lips, and in the fauces, farther contribute to impair the speech, by preventing the free motions of those parts. A cold sweat, cold extremities, and great collapse of the countenance, together with laborious respiration, and rattling in the throat, are signs of impending dissolution.

The cause of Fever.—At present we shall confine our attention to the remote causes of fever; the proximate cause will be the object of discussion in the sequel. (See CAUSE, in Medicine.) It is not always easy to distinguish between the predisposing and the exciting causes of fever; and circumstances which have been ranked among the latter by some physicians have been considered by others as operating only in the former way; and it would seem that in certain cases, where the predisposing causes are applied suddenly or to a great extent, they actually become exciting causes of the disease. The middle periods of life appear to be more liable to fever, than either of the extremes of old age or infancy. Inflammatory fevers in particular are more readily produced in the vigour of the constitution, or in youth, from the period of puberty to the age of 35 or 40. Whatever produces either of the opposite states of plethorism and asthenia, or ination and debility, predisposes the habit to fever, and favours the operation of the exciting causes; plethorism giving a predisposition to fevers of the inflammatory kind, while ination predisposes to intermit-tents, remittents, and to the nervous or typhous fever from contagion. Hence, with respect to the last mentioned circumstance, the connection between had durt, or fear of food, and fever, has been observed from the earliest periods of history, and pellagia and famine have been commonly mentioned in connection with the occurrence of contagious fever in London, during the winters of 1799 and 1800, was occasioned by the predisposition to be affected by contagion, which the fear of provisions in those years produced; and that the almost total disappearance of such fever, since that period, must be ascribed to the absence of such predisposition; since the exciting or occasional causes continue to exist as before. Galen justly remarks, "Opotet enim hoc in toto servor na membra repugere, quod nulla caufarum fines patientis aptitudo agere potest." (De Difer. Febr. Trans. of Leonicenus, lib. 1. 1809.) It is not improbable, however, that the depraved aliment, which is used in times of scarcity, may of itself actually produce fever. The weakness produced either in the nervous system, by depriving the patient, such as fear and grief, or in the fanguineous system, by great evacuations, appears to constitute a great predisposition to be affected by fever. With respect to the depressing passions, there cannot be a doubt of the influence which they exert in predisposing the body to suffer from the exciting causes of fever. The observation that the pain occasioned by the prevalence of a contagious epidemic disease, tends to favour its progress, is as old as Thucydides; who has mentioned, that those who were low in spirits, and felt much fear and anxiety during the dreadful pestilence which he has described, were cut off most speedily. Diemerbroeck quotes an observation of Pigneur, who compares the effect of imperfect aliment on the body with that of the depriving passions on the mind,
in facilitating the access of the plague. "Sicut mala
vitæs ratio preparat humores, sic animi paﬃones preparat
spiritus ad recipiendam pellem; et tristitia, terror, ira, ac
metus, sunt pabulum ac nutrimentum pestis." And
Bauderonus obseruer, "Conﬁdentem ut plurimum fervatur;
contra metu(end) facile corririuant." (See Dierembroeck,
de Pefel, lib. i. cap. 8. § 9. and again, lib. ii. cap. 7. Annot.
where much evidence on this point is collected.) The
debility occasioned by fatiue, from violent or long con-
tinned exerciion, is another cause which predisposes the
body to be affected by the exciting cau ses of fever. This
is, without doubt, one of the reasons why soldiers, har-
rqrafed by fatiues of a campaign, so readily fall into fever
when conﬁned in hospitals and barracks. The fact was so
generally observed, at the time of the epidemic fever which
Dierembroeck has described, that many among the lowest
people abstained from hard labour; even the peasants during
the hay-harvest were unwilling to work and collect the hay,
being taught, by many lamentable examples, that those who
undertook any severe work were immediately afterwards
feized with the plague. (Loc. cit.) It is probable, in-
deed, that very violent exerciﬁes, as well as violent and
indulgent ﬁtts of pafﬁon, may at once throw the fyllem into a
febrile state; we are certain that an epidemic, beginning
with ﬁvering, which is succeeded by heat, and, lately, by
sweating, is not an uncommon refeult of a fever’s day’s jour-
ney, nay, in those who are unaccustomed to such exer-
ciion. Exeexs in the gratiﬁcation of the venereal appetite,
as contributing to debilitate greatly, especially the nervous
fyllem, is jujly ranked among the predisposing cau ses of
fever. Evidence of the pernicious inﬂuence of this exeexs
was abundantly manifested during the last plague at Marccilles,
in which the recently married people suffered greatly. In-
omoderate study or other application of the mind, which not
only implies a fedentary life, but particularly an encroach-
ment on the hours of sleep, which greatly debilitate and
exhaust the nervous fyllem, also favours the action of the
exciting cau ses of fever, if it does not actually in some cases
bring it on.

Yet notwithstanding the unquestionable inﬂuence of a
debilitated state of the constitution, in general, in giving a
predisposition to fever, it has been observed, that persons
labouring under particular diseases, which are connected
with much debility, are not liable to be affected by the
exciting causes of fever. Dr. Gregory remarks, in his
letters, that he has known persons much debilitated by
dropy, and pulmonary consumption, who have been greatly
exposed to the operation of contagion, without being at-
tacked by fever; and Dr. Lind observes, that those who
labour under feaver are less liable to be attacked with fever
from contagion, than those in health. (Treatise on
Scurvy.)

There is a particular predisposition attached to certain
constitutions, (which are not to be distinguished by any
external character,) to be affected by the exciting cau ses of
feaver, upon every ﬂight exposure to them. This is daily
exempliﬁed in respect to contagion, and is often observed
with respect to the eﬄuvia of maladies. The predisposition
to be affected by both these causes, but more especially by
the latter, is diminished by the habit of exposure; so that
new-comers are more certainly feized with intermittent and
remitting fevers, for inﬂuence in the countries where they
prevail, than the inhabitants: and the attendants on patients
labouring under continued fever are perhaps less liable to be
infected than visitors. The greatest predisposition to inter-
 mittents appears to be occasioned by a previous attack of
the disease, inasmuch that a relapse is often produced, at
some distance of time by very light cau ses, and even, it
would appear, without exposure to the original exciting
cau se.

Particular seasons, especially those in which great heat
prevails, or, in low countries, those which are very wet,
seem to give rise to a great predisposition to fevers; the hot
seasons producing a tendency to bilious and inﬂammatory
fevers, the wet to intermittent and remittent, and the
combination or alternation of the two is particularly per-
nicious. The history of medicine shews us, that it is in
such fevers that contagious and pestilential fevers have
most generally prevailed. (See Epidemic.) Great heat,
indeed, appears to be frequently an exciting cause of fever,
especially in warm climates. (See Insolation.) An
exposure to cold and moisture appears also to favour the op-
eration of the exciting causes of fever, especially of the mias-
ma of marshes in the production of intermittent and re-
mittent fevers. It is hence, probably, that the night-air
appears to be so fatal near the coasts in tropical climates, as
related by Dr. Lind, Dr. Badenoch, (Med. Ofﬁ. and
Inquir. vol. iv. p. 156.) Bontius, Ronpe, and others. Dr.
Lind has stated, that, "during the ﬁckly season, a boat,
belonging to the Medway man of war, which attended on
more every night to bring fresh provivals, was three times
successively manured, not one of her crew having survived
that service."

We must here notice a circumstance respecting the pre-
disposition to fevers, in warm climates, which was ﬁrst
noticed by Dr. Lind, of Windsor, in his inaugural essay,
published at Edinburgh in 1768, and afterwards more par-
ticularly examined by Dr. Jackson and Dr. Balfour; namely,
the inﬂuence of the moon, or of the sun and moon con-
JOINTLY, in giving a predisposition to fevers to the human
body. Dr. Mead, indeed, had collected some evidence of
the inﬂuence of these luminaries in this climate, (see his
treatise De Imperio Solis et Lunae,) but that inﬂuence has
been said to be much more obvious in tropical countries,
in producing relapses or ﬁrst seizures of fever. Dr. Lind
observed eight feamen attacked by a relapse at the same
time, during the occurrence of a lunar eclipse, which of course
implied a full moon. Dr. Jackman made some observations
on the subject in 1776, in the West Indies, and found that
of 30 cases of remitting fever, 28 had happened on one or
other of the seven days preceding a new or full moon; in
the following years his observations were continued, and
seemed to conﬁrm this result. (See London Med. Journal,
vol. viii. p. 25.) In 1785, Dr. Balfour published "A tre-
atise on the Inﬂuence of the Moon in Fevers," in which he
states that the attack of the bilious remittent fever of Bengal
almost invariably commenced on one of the three days which
immediately preceded and followed the change of the moon;
and that the changes of this planet are no less remarkable
for occasions relapses. "For my own part," he says, "I
have observed this tendency to relapse at the full and
change invariably for these fourteen years; and in particular
cases can prognosticate the return of the fever at these
periods, with almost as much conﬁdence, as I can foretell
the revolution itself." Dr. Lind, however, fifteen years
after the publication of his thesis, seems to have changed
his opinion, and was disposed to attribute the frequent at-
tacks and relapses of these fevers "to the noxious vapours
arising from the swamps, produced by the high tides, which
happen at the time of the full and change of the moon, and
overwhelming a great part of the country, leave it in a mirrhy
state at low water. This I am induced to believe to be the
sole cause," he adds, "that because this lunar inﬂuence
certainly ceases, when the patient is removed but a few miles
from
Fever.

from the swamps that are left uncovered by the tide at low water; secondly, because intermittent fevers are not observed to follow lunar periods at many places within the tropics, even at Canton, where there is a large river and great tides, by reason of the indolent Chinese keeping the river within its bounds." (Lond. Med. Journal, vol. viii. p. 146.) But Dr. Jackson contends, that at Savannah la Mar, in Jamaica, the connection of the moon with fevers is more remarkable than in any other part of the world, in which he has been; although the tide scarcely ever rises eighteen inches, and the bank is sandy. (Ibid. p. 302.) Dr. Balfour has supported his original doctrine in subsequent publications "on lollunar influence" to which we refer the reader for farther evidence. See also Dr. Jackson's Treatise on the Fevers of Jamaica.

Exciting causes of Fever.—Dr. Cullen was of opinion that idiopathic fevers were induced by the operation of two exciting causes only; namely, contagion, or human effluvia, and the misfnata of marshy or swampy ground; the former giving rise to continued, and the latter to intermittent and remitting fevers. (See Effluvia, in Medicin.)

It seems probable, however, that this opinion was adopted rather in conformity with his hypothesis respecting the nature of fever, than from a comprehensive observation of facts; and his reasoning in support of it is liable to much objection, if not to an easy refutation. "As fevers are so generally epidemic," he says, "it is probable, that some matters floating in the atmosphere, and applied to the bodies of men, ought to be considered as the remote cause of fevers; and these matters present in the atmosphere, and thus acting upon men, may be considered either as contagious, that is, effluvia, arising directly or originally from the body of a man under a particular disease, and exciting the same kind of disease in the body of the person to whom they are applied; or misfnata, that is, effluvia, arising from other sublances than the bodies of men, producing a disease in the person to whom they are applied." (First Lines, § lxviii.) Now, it has been demonstrated by modern experiments, that contagious effluvia are not capable of floating in the atmosphere, to the distance of even of a few yards, without losing their infectious quality, and that the noxious powers of misfnata are similarly, though not equally, limited. (See Contagion.) And, although fevers are often epidemic, yet they are seen daily sporadic, i.e. limited to individuals, who breathe the same air with thousands who escape; and we have endeavoured to show, that the flippage of the existence of those causes of epidemics floating in the atmosphere, is not only gratuitous, but absolutely in opposition to a number of facts. (See Epidemic.) Besides, even vulgar observation has left no room for doubt, that many of the circumstances, which induce a predisposition to fever, or favour the operation of contagion, misfnata, and other exciting causes, of such kind, exist themselves the exciting causes of the simpler forms of fever, whether denominated chymereps, simple fever, fycnochus, or by some other term. That such fevers are frequently occasioned by exposure to great heat, and to cold and moisture, by fatigue, anxiety and grief, without the least intemperance, that is admitted by physicians in general; (see Fordyce Fleet Diff. on Fever, p. 136 to 179.) Husham on Fevers, p. 2. &c.) and when it is considered how frequently we see individuals affected with fever and even fatal fevers, when no source of contagion was known, when no epidemic was prevalent, and when the rest of the family, whose mode and circumstances of life were in all points the same, were not affected by any diæse, we can scarcely hesitate in affixing the origin of the fever to some one of the causes just enumerated. The statements of the ancient physicians accord accurately with those of the moderns, just quoted, on this subject. "Quod igitur ex laboribus," says Galen, "ira, tristitia, et lobis ardoribus, atque frigibus, vigillis, et eruditibus, erictibus, et crapulis. quidam fabicitarie confpiciuntur, nemo eft qui, ipso doctus experientia, non arguo." (De Different. Febr. li. i)

Contagion is, however, the exciting cause of the most dangerous and fatal forms of continued fever, whether occurring in gaols, hospitals, ships, camps, or among the dwellings of the lower classes of the people, and thence denominated gaol-fever, hospital-fever, &c. or malignant, putrid, contagious fever, typhus, &c. Of the nature, origin, and mode of communication of contagion, as well as of the means of preventing its operation, avoiding its influence, and destroying its powers, we have already treated at length in a preceding article, to which we refer the reader. See Contagion.

Many physicians of the last century were of opinion that intermittent fevers were produced by contagion; among these were Boerhaave, Van Swieten, Baglivi, Cleghorn, and Fordyce. It is probable that these fevers may have sometimes spread in hospitals, like erysipelas, puerperal fever, and other disorders, not in themselves contagious, before the present system of ventilation and cleanliness was fully adopted; but, we believe, that few physicians at present support that opinion. Lancisi was the first who pointed out the connection of intermittent fevers with the effluvia of marshy ground; his observations, however, were long overlooked by medical men. But, in our own country, we have now ample evidence of this connection; it is chiefly in the low and flemmy counties, as in Lincolnshire, Cambridgeshire, the hundreds of Essex, &c. that agues originate; and those which are seen in London, and other parts remote from the fens, can generally be traced to those counties. In the neighbourhood of the Pontine marshes, near Rome, the fact is so universally known, that the villages are all perched upon the hills; and there are fearely people sufficient in the levels to expedite travellers from the poll-houses. The army physicians have also obtained much decisive evidence relative to this fact. The nature of the exhalations of marshes, which give rise to intermittent and remitting fevers, is not however ascertained; it is obvious that it is not moisture alone, evaporating from the surface of the marshes; it appears to be rather the result of the decomposition of animal and vegetable matter in water. (See Miasmata.) Sir John Pringle remarks, "that neither canals, nor even large inundations, where the water is deep, are nearly to dangerous, or exhal: to much nauseous vapours, as marshy grounds, or meadows that have been once flooded and lately drained; and that fields, though dry in appearance, may yet be most by the transpiration of the subterraneous water." (On Diseases of the Army, part ii, chap. 2.) "It has been generally remarked," Dr. Rolli observes, "that the effluvia of marshes are most active, when the water is boiled off, and the earth appears, which was certainly the case in St. Lucia; the greater part of the regular intermittents, that is, of the milder fevers we had, happened when the rains were most frequent, and before the stagnating pools discovered their bottoms; but the most dangerous remittants appeared when the marshes had no water, but a slaty matter on their surface. Cairo is healthy while the Nile inundates the neighbouring lands; but when the mud is exposed, on the retreating of the river within its banks, the fevers begin to rage as the miasmata rise. These effluvia, like thefe of contagion, as we have already stated, are limited in their operation, we mean in the distance
Fever.

Fever: to which they are capable of being communicated through the air, in an active state. Dr. Lind observes that, in ships lying at some distance from a swampy shore, the men escape intermittent fevers, though infected in fogs; but when they approach near shore, or communicate with the land, they become affected. Those who were sent on shore for provisions, especially in the night, as mentioned by Dr. Badenoch, speedily perished in consequence of the fever thus induced: partly, perhaps, in consequence of a pre-disposition to be readily affected by the miasma occasioned by the cold of night, and partly from the condensation and more active state of the miasma arising from the same cause. These effluvia rise to so small a height, that folders lying in the first floors of barracks in Jamaica were little affected than those in the ground floor, as stated by Dr. Hunter: who has also affirmed, that a few hundred yards often include the limits between healthy and unhealthy ground in camps. (Observ. on the Diffuses of the Army in Jamaica.) See Epidemic, under the second head; where other facts are enumerated, and some observations added respecting the disappearance of intermittent and remittent fevers in London, and other large cities, in consequence of the removal of the sources of miasma, by improvements in the structure, and cleanliness of the streets, &c. Under all these circumstances, intermittent and remittent fevers are most prevalent in autumn, in which season, especially when wet, they are the fatal endemics in low and damp countries. Of this we have a recent example in the mortality occasioned by the late unfortunate expedition to the island of Walcheren; which, indeed, might have been anticipated; (Oct. 1809,) for Sir John Pringle long ago observed, when speaking of the United Provinces, "But the air is warld in Zealand, as that province is not only low and watery, but surrounded with the cozy beaches of the eastern and western Schelcht, and the most marshy parts of the country; so that almost every wind, except from the sea, adds to its native moil and unhospitable air." (Loc. cit. part i. chap. 1.) In the autumn of very wet years, intermittents have been observed to occur even in high, and at other times dry situations; thus they were produced in certain high parts of Northamptonshire, where they were not known to have existed either before or since, in the year 1782, which was remarkable for the wetness of the summer. (See the Syllabus of Lectures given at Guy's Hospital, p. 15.) The operation of heat, in augmenting the deleterious effects of these miasmatas, is evident, as well from the general occurrence of intermitting and remitting fevers in the autumnal season, as from the more frequent and formidable fevers of this sort, which are generated in warm climates; witness the periodical fevers of Cairo on the burning of the Nile, and those which occur near the other great African rivers; as on the coast of Guinea, where the country is often half depopulated by them, and some parts even quite debastled from this cause. (Ibid.) The overflowing of the Euphrates, and the flagellation of the water on the adjoining desert, have always been considered as the principal causes, especially in the hottest seasons, of the fatal remitting fever of Buffon. (See Transact. of a Soc. for the Improv. of Med. and Chirur. Knowledge, vol. i.) Whence the Arabs sometimes imitate the desert, by breaking down the banks of the Euphrates, in order to be avenged on the Turks of Buffon. The fevers induced by a single inundation have been known to destroy between twelve and fourteen thousand of the inhabitants of that place. (See Wilson on Fever, vol. i. p. 152.) It is fortunate, however, that the miasmata is not, like contagion, capable of adhering to clothes, or other substances; but is diffiluted and becomes harmless in the atmo-

sphere, as we have before observed, at a short distance from its source.

It is worthy of remark, that both contagion and miasma, or, to use the words of Dr. Cullen, both "human and marsh effluvia," appear at times, to operate rather as predisposing than exciting causes; while those circumstances before enumerated, as inducing a predisposition, become in fact the exciting causes of the fever which ensues. It has been observed by Dr. Lind, and others, that persons exposed to the influence of contagion, sometimes receive it into the system, in which it remains latent, or producing only slight indisposition, such as headache, languor, &c. for a considerable time; when exposure to cold; an act of intemperance, in drinking, eating indigestible food, fatigue, wetting, or anxiety shall occur, and immediately the contagious fever is produced; which would lead us to believe that many of these persons, who remain uninfected, after considerable exposure to contagion, escape in consequence of the absence of such exciting cause. "The same cause, which gives rise to relapses," says Dr. Lind of Hoffman, "I am inclined to think does sometimes exist, or render active, an infection, before received into the body, but so slight, as of itself to produce no bad consequences. I am confirmed in this opinion by the quick and sensible effect of infection from bad fevers, when in such a degree as itself to communicate the disease. But if a person perceives no symptom of an infection, till many days after having left his place of abode, and is first taken ill of it immediately after having been wet with rain, exposed to cold or damp, or having been guilty of intemperance and excesses, it is probable that these causes have excited this dormant poison into action; and that, without their influence, it would never have affected the constitution." (Lind on Fevers and Infections, chap. ii. p. 1.) In a similar manner, the miasmata often exert no influence on the constitution, for several weeks after the person has left the febrile district, when the ague shall be immediately excited by a debauch, a quarrel, being wet or chilled, &c.

Exposure to cold is commonly mentioned among the exciting causes of fever; and it can scarcely be doubted that the simpler forms of fever do frequently originate from this cause: and as these more simple fevers are occasionally converted into the more severe or malignant species, by the confined or uncleanly situation of the patient, by improper treatment, or in consequence of some peculiar state of the constitution, so cold may justly be ranked among the common causes of fever. This notion, however, as it is popularly entertained, is carried far beyond its just extent. We have already seen that cold operates by pre-disposing the body to be acted upon by contagion and by marsh miasma; and also, secondarily, by calling into action the dormant poison of both species. In these cases, its operation is only indirect. More commonly the popular opinion ascribes from a miasma, which confides in suppuring the first symptoms, (see the shivering and sensation of cold) to be in fact the cause of the fever; these symptoms being considered as the effect of an external chill, when they are, in truth, the result of the internal condition of the circulation and nervous system, as before explained. Hence fevers have been attributed to cold, which proved to be the eruptive fever of small-pox, or measles, and, of course, originated from contagion. On the whole, exposure to cold must be considered as most commonly concurs with thenoxious effluvia, and other causes, in producing idiopathic fever, and not as alone the active agent. Thoroughs are constantly exposed to cold in this climate, in whom no fever is excited; and in the great majority of those who are affected by cold, the diseases thus occasioned are principally
the symptomatic fevers connected with local inflammation, constituting the second class of "Phlegmata" in Dr. Cullen's arrangement, as mentioned in the commencement of this article. The general effects of cold on the human body, as well as its particular effects in the production and alleviation of diseases, have been discussed at length under a former head. See Cold, in regard to its action on the living Body.

It would appear that the effluvia arising from animal, and even vegetable substances, during the process of putrefaction, have in some instances given rise to fevers of a severe and fatal kind. (See EPIDEMIC.) But under what particular combination of circumstances such fevers have been excited, it were not easy to state: it would seem, however, that animal putrefaction alone is not capable of producing these effects; since persons engaged in particular trades, in which they are much exposed to these effluvia, do not suffer from fever, as skinner, nightmen, &c.; nor are students of anatomy particularly affected by fevers from the often putrid effluvia of a dissecting room.

A redundance of bile has been supposed to be a common exciting cause of intermittent, remitting, and continued fevers, chiefly from the circumstance, that it is often thrown up from the stomach in considerable quantity, during the sick-days which occur at the onset of these fevers. But it should be observed, that vomiting, however excited, (whether by the commencement of fever, by substances taken into the stomach, or by agitation on a shipboard at sea,) if often repeated, with violent drawing, generally brings up also the contents of the duodenum, and emesis the ducts, which open into that part of the intestines. Bile, therefore, and pancreatic juice, are thrown up in the half efforts to vomit, but not in the beginning. This appearance of bile, therefore, is not an essential part of the attack of fever; it is merely accidental. "If the pancreatic juice," says Dr. Fordyce, "had been blue, and had any particular taste or smell, and the bile had been colourless, inodorous, and as much so as the pancreatic juice is, in that case, whatever has been said of the redundance of bile, as an essential part of the attack of fever, would have been said of the pancreatic juice." (First Diff. on Fever, p. 93.) Dr. Cullen remarks, that the opinion may have been partly countenanced by the fact, that intermittent and remitting fevers, being the effects of marsh effluvia, occur most frequently in the warm seasons, and the latter in warm climates, from the influence of which the bile is disposed to pass, by its secretory, in greater quantity than usual, and, perhaps, also changed in its quality; but he considers this appearance of bile, when vomiting takes place, as a circumstance accidentally concurring with the fevers, from the state of the liver in which they arise. (First Lines, § 51.)

When an exciting cause of fever has once produced its operation, the constant or repeated application of that cause is not required to keep up the disease; on the contrary, the disease will then go through its course, although the cause be entirely removed; nay, farther, it will not be increased, it is said, in degree or duration, by a subsequent application of the same cause, but will go through its course unaltered. (Fordyce, First Differt. p. 180, et seq. also in Tran. of a Soc. for the Improvement of Med. and Surg. Knowledge, vol. i. art. 1.) Thus, to adduce a palpable example, a second inoculation of small-pox adds nothing to the violence of the disease produced by the first infection of the poison: thus, also, to use the words of Dr. Fordyce, "a fever taking place from infection in the most wealthy and notified persons in the country, and treated with all attention, with regard to infection, goes through its course in the same manner as in a patient in an hospital, where there are many others afflicted with the same disease, provided that attention is paid that there shall be an equal change of the air of the atmosphere, and freedom from putrefaction." (Loc. cit. p. 189.) On the whole, this statement may be considered as begging the question, and Dr. Fordyce seems to have generalized too far, in transferring his observation respecting small-pox to idiopathic fever. For, with regard to contagious fever, we produce an equal change of the air in an hospital, as in the chambers of the rich, the contagion cannot be constantly applied in any considerable quantity. And, with respect to intermittent and remitting fevers, it is a well known fact, (even noted by Dr. Fordyce himself, though explained upon the notion of avoiding humidity,) that those fevers, although they remained oblique while the patient continued exposed to the miasma, which produced them, speedily yield to the same treatment, when the patient is removed. See the Transactions before quoted, p. 14.

Doctrines respecting the Nature or proximate Causes of Fever.—Physicians have been eager to explain the nature of fevers from the earliest dawn of medical history, and have too often quitted the laborious task of observation in pursuit of hypothetical speculations, which have tended to obscure, rather than to elucidate, the science of pathology, and to retard the progress of its improvement. Instead of accurately marking and comparing the phenomena of life, and thence deducing the laws of the animal economy, whether in health or disease, physicians have too often contented themselves with transferring the deductions of the collateral sciences to the doctrines of life, misapplying their conclusions in analogies, which existed only in their own imaginations. Hence not only the fictions of the Greek philosophy, but the principles of the more certain sciences, of mechanics, of chemistry, of magnetism, and of electricity, have been assumed in succession, as explanatory of the action of living bodies, and have each contributed not a little to confude the language and opinions of pathologists. This is more particularly obvious with respect to the doctrines relative to fever; which, from the universality of its occurrence, the striking appearances which it exhibits, and the ravages which it has committed in all ages, has always arrested the attention of mankind, and has employed the pens of the most enlightened professors of medicine for upwards of two thousand years. Nevertheless, it is at this moment a subject of discussion, and of much difference of opinion; physicians being divided in their views both of the essential nature of the disease, and respecting the seat which they ascribe to it in the body; and one of the latest practical writers on the subject, whom we have often quoted, has affirmed, that "what is the real derangement in the system is, which produces the external appearances in fever, is not at all known." Fordyce.

Although nothing absolutely satisfactory, however, is to be obtained from an investigation of the doctrines which have been promulgated relative to fever, it will be necessary to state the outlines, especially of those of modern times, which have assumed a systematic shape, and have given colour to the various modes of practice that have been pursued.

Various gratuitous hypotheses respecting morbid derangements of the fluids of the animal body, and the generation of new morbid humours, have prevailed, with occasional modifications, from the time of Hippocrates downwards; and although in the systems of Hoffmann and Cullen, and still more completely in those of Brown and Darwin, these hypotheses are rejected, and are also exploded among British practitioners.
practitioners in general, as incompatible with more correct observation, they are nevertheless the prevalent doctrines of the people at large. (See *Humoral Pathology*.) Hippocrates considered the morbid heat as the essence of fever, and upon this notion he seems to have founded his division of the varieties of the disease; as the *causa* *funebris*, or burning fever; the *leptolympha*, in which the external parts are cold, while the internal are hot; and the *epilus*, *epilepsia*, or mild fever, in which there is a simulatreous feeling of heat and cold. (See Hippoc. *lib. i. and ii.* *de medicina*, 55; *Edit Facsim.* &c. Franzi. &c.) These different forms of fever he ascribes to the superabundance of one or other of the four humours, blood, phlegm, yellow and black bile, (see *Hippocrates*), and he seems to consider the disease as the result of a conflict on the part of nature, (the preceeding principle of the animal body,) to expel the morbid humour, or to render it inert and harmless by the process of *concentration*.

Paffing by the absurd notions of Aesclapiades, respecting the motion of atoms or corpuscles, which, when it was free, constituted health, and, when obstructed, excited fevers, &c. which again differed according to the size of the corpuscles; (see Calias Aurelianus, *lib. i. cap. 14.*) and the hypotheses of other ancient physicians, which have been imperfectly transmitted to us; we come to the doctrines of Galen, which were universally received and taught, where science existed, for the space of thirteen centuries. The hypotheses of Galen were little more than an amplification of that of Hippocrates, with which he combined other hypotheses, deduced from the philosophy and science of his age, and thence, by giving a systomatic form to the doctrine, and supporting it with so much learning, he at once multiplied and perpetuated the corruptions of medical science, which the inductive and experimental philosophy of our own times has not yet exterminated. (See *Galen*.) He also considered the preternatural heat as the essence of the febile state, and enters into several plausible statements explanatory of its origin. He observes that heat is excited by motion, by putrefaction, by the direct application of heat, as of the sun or fire, or by the retention of warmth, which should be dissipated, or by the addition of a sort of ferment. Whence the exciting causes of fevers are easily understood in regard to their operation: the heat of the atmosphere, which prevails about the rising of the dog-star, increases the heat of the heart, (being taken in by breathing the hot air,) and all the heat of the arteries on the surface; over-fatigue and violence exercise occasion heat by the increase of the muscles, tendons, and joints; and much and crude aliments produce an acid and putrid humour, which excites heat; and the putrid matter in the air, during the periods of pestilence, when inspired, excite putrefaction and heat in the body, especially when the habit is already predisposed to putrefaction, from bad diet, &c. The fevers thus excited are modified by the prevalance or putrefaction of one or other of the four humours of Hippocrates: of the three kinds of intermittents, the quotidain arises from the corruption of phlegm, the tertian from that of the yellow, and quartan from that of the black bile. Wherever the heat begins, it extends to the heart, whence the general comotion of the vessels is excited: “and Nature is employed in exerting her powers, endeavouring to assimilate the good humours to the parts which are to be nourished, and to expel the bad humours. But if at any time Nature is unable to expel all the morbid humour, either from its thickness, its abundance, or its tenacity, or from some obstruction of the passages, or from her own want of power, it necerally will undergo putrefaction, if it remains long in the animal body.”

But by putrefaction Galen appears to mean any new combination or change of quality, for he includes *concentration* under that term. “Aliter autem putrefactio, quam et coctionem effe diximus, &c.” (De *Differentiis Februm*, *lib. i.* See also Van Swieten, *Com. ad Aph. 770.*

This doctrine, which became known throughout Europe on the revival of learning, kept possession of the schools until the middle of the seventeenth century, when a new light was thrown upon the subject of the animal economy by the discovery of the circulation of the blood. But in the various parts of this doctrine, afterwards variously combined with the fyltems which or, joined with the further progress of the collateral sciences, we sce the rudiments of most of the theories which the modern systematics advanced; until at length the phenomena, connected with the irritable and sensible properties of the living solids, were attentively investigated in the course of the lat century. A humoral pathology, connected with the notions of obstruction, acrimony, lector, phletora, or putrefaction in the vascular system, and of a regulating principle, nature, auctoritas, arcbus, anima medica, vis medica mater naturae, or by whatever term it may have been denominated, was found in all the systems, down to that of Boerhaave inclusive, whether among the mathematical, chemical, or mechanical facts. (See *Medicine.*) Hence various means of removing fevers were suggested, and remedies were employed by one set of physicians for correcting acrimony, for aiding putrefaction, for obviating phletora, for evacuating the morbid humour, or for diluting them; and regulations were adopted by some for supporting the operations of nature, and for removing obstructions or interferences with them; while others, considering the rational soul as the directing principle, were content to look on, and trust to its wisdom, cultivating what they called the art of medicine by expectation; which contented rather in renouncing all art, and in banishing all active remedies.

These doctrines, respecting the morbid condition of the humours in febile diseascs, and the conflict of nature in attempting to subdue their effects, to change their nature, and to expel them from the fyltem, &c. originated in ignorance of the structure and operations of the animal frame, were propagated by the bigotry of learning, which would rather err with Galen, than question his authority on matters of the smallest moment; and were strengthened by the facility with which the new discoveries in chemical and mechanical philosophy combined with them, in explaining the motions of the circulating fluids. They were counteracted also by the various discharges which accidentally occur in the crises of fevers, of which the notion of concentration, or of fermentation and desposition, deduced from a chemical analogy, afforded a plausible explanation. But we have already stated, that the inferences drawn from the appearance of these discharges were incorrect: for that the latter were the signs and effects of a favourable change in the disease, and not the causes of it. (See *Concentration*, and *Cries.*) Nor is the notion of a materia morbi, in the fluids in fever, functioned either by observation, or by the most successful plan of cure. When the discharges attended to consist of the secreted fluids, they contain nothing which is not ordinarily present, although in less quantity; when they consist of blood, it cannot be imagined that the small portion evacuated has contained all the morbid humour with which the general system was infected. But many fevers are cured without waiting for concentration, or evacuation; and the occurrence of absolute intermissions is not easily reconcilable with the existence of such morbid humour.

The:
The dawn of a more correct knowledge of the morbid actions of the animal system, of which some glimmerings had appeared in the writings of our countrymen, Willis, and of Baglivi, (in their treatises "de Pathologia Cerebrum et Nervorum," and "specimen de febra materice et morboribus") was obvious in the works of Hoffmann, before the middle of the last century. He directed the attention of physicians to the primary moving powers of the animal frame, the functions of the nervous system; functions which, had not the pernicious influence of learned authority led medical observers out of the proper train of investigation, could not have been overlooked for so many ages. The properties of the living soul were now investigated by Guassius, Haller, and others; even Boerhaave himself began to attend to them, and in the fourth edition of his Aphorisms, (see Aph. 725,) added the words, "forte et nervosi (fœl. facci) tam cerebrum quam quatern cerebelli cordi delineati inherint," (a flagellate of the nervous fluid communicated from the brain to the heart,) to the flagellate of the arterial fluids, which he had formerly flated as the proximate cause of fevers.

From this time the phenomena resulting from the sensorial functions in disease became the subject of more attentive investigation, and hence have arisen those modern systems, in which the nature of fever is explained by a reference to these functions, to the exclusion of any supposition of disease in the fluids, except as an effect of the fever. These are the theories of Cullen, of Brown, and of Darwin. The theory which Dr. Cullen promulgated, from the medical chair in the university of Edinburgh, almost rivaled that of Boerhaave in the extent of its reception; and even continues to be adopted, with slight modifications, by some later writers (See Currie, Reports on Water, p. 165, 2d edit.) It had the merit of great ingenuity, and of according more completely with the advanced state of knowledge respecting the functions of life, than the hypotheses which preceded it. The Brunonian theory of fever is not particularly prominent in the general system of its author, who reduced all diseases to two or three very simple principles, without much regard to the variety of phenomena, by which we are futfaced. That of Dr. Darwin is more complex, but much more comprehensive in its application to the varieties of fever: it is obscure, however, from the peculiar language in which it is expressed. We shall state the outlines of each of these theories.

Dr. Cullen's Theory.—The first change induced in the animal system, by the operation of the exciting causes of fever, is, in the opinion of Dr. Cullen, a "diminution of the energy of the brain," which is indicated by all the symptoms of the first stage of fever, as we have already explained. The powers of the body and the mind, the functions of sensation and motion, respiration, circulation, and secretion, all fail, or are diminished in the general debility; but after a certain time, a morbid inercean of some of these functions, especially of the circulation, takes place, with an augmentation of the heat. The three stages of debility, of cold, and of heat, which regularly succeed each other in fever, in the order just mentioned, are presumed to exist in the relation of cause and effect; the first stage being the result of the debilitative influence of contagion, marsh mistmate, and cold, which are the exciting causes. Dr. Cullen acknowledges his inability to explain satisfactorily, how the debility produces all the phenomena of the cold stage, especially the spasmodic contraction of the extreme arterial vessels, which is inferred from the suspension of the secretions, and the shrinking of parts in the cold stage, as well as from the continuance of this suspension in the hot stage, after the action of the heart and large arteries is increased. Were the contraction of the cold stage merely the result of the weakened action of the heart, it is supposed, that, on the return of its ordinary or increased action, the contraction would be removed, and the secretions restored. Here Dr. Cullen's facts to "the Vis Medicatrix Nature," so famous in the school of physic," the innate preserving power of the constitution, which has been appealed to for the solution of difficulties by all medical theorists, from Hippocrates downwards. This "pain of the extreme vessels," then, is considered as "a part of the operation of the vis medicatrix nature;" at the same time, Dr. Cullen is of opinion, that, during the whole course of fever, there is an atony existing in the extreme vessels, depending on the diminished energy of the brain, and that the relaxation of the pain requires the restoration of the tone and action of these.

To this story in the vessels of the skin, he attributes the loss of appetite, nausea, and vomiting, the stomach being affected by sympathy. The pain induced in the exterior vessels throws a load of blood upon the central parts of the circulating system, which proves a source of irritation to the heart and arteries, and excites them to a greater action, which continues till the pain is relived or overcome. The hypothesis is thus briefly recapitulated. "Upon the whole, our doctrine of fever is explicitly this. The remote causes are certain febrile powers applied to the nervous system, which, diminishing the energy of the brain, thereby produce a debility in the whole of the functions, and particularly in the action of the extreme vessels. Such, however, is, as at the same time, the nature of the animal economy, that this debility proves an indirect stimulus to the fanganeous system; whence, by the intervention of the cold stage, and pain connected with it, the action of the heart and large arteries is increased, and continues so till it has had the effect of restoring the energy of the brain, of extending this energy to the extreme vessels, of restoring therefore their action, and thereby, especially removing the pain affecting them; upon the removal of which, the excretion of sweat, and other marks of the relaxation of excitors take place." (Cullen, First Lines, § 6.)

Perfect as this hypothesis undoubtedly appears, it is liable to several objeets of criticism, partly, because it is gratuitous in some particulars, and partly, because it is not applicable to all the phenomena of fevers. In the first place, it must be remarked, that by affuming the existence of a power or agent, such as the vis medicatrix nature, we require no knowledge; and advance not a step further in our explanation of the facts, than if we flated simply that the facts occur. It is an admission, that the facts are inexplicable, that they are part of the phenomena of life, which we deem incapable of further generalization in the present state of our knowledge. This creation of imaginary agents, to account for ultimate facts, has had a pernicious influence in every department of science. What information did philosophers acquire respecting the laws of gravitation, by the sublimation of an ether; or physiologists, respecting senation and muscular motion, by the supposition of a nervous juice? Yet upon the same footing stands this autocratica, or via medicatrix, in regard to the laws of the animal economy. It is an imposition, by which we conceal from ourselves our own ignorance, and prematurely arrest the progress of inquiry. But this is for another day.

This hypothesis, however, is not only gratuitous in the assumption of a particular agent, but also in affuming the existence of a pain in the extreme vessels, and in supposing the cold stage to be the cause of all that follows. The phenomena,
Fever.

Phenomena, presented by the skin in the cold stage, may arise from the mere feebleness of the heart, which is rendered unable to distend the distant and minute vessels with blood, or from a mere inaction of the cutaneous capillaries, independently of the heart, as we believe to be the case; and not from a spasmmodic contraction of the extreme vessels. And the premonition of the continuance of that spasm, when the superficial vessels are filled and distended with blood to a preternatural degree, would appear to be inconsistent with observation; for spasm and dilatation are terms of opposite import. The same vessels, which receive little or no blood in the cold stage, and are over distended with it in the hot stage, cannot be in both cases affected with spasm.

But, it is contended, the peripharal vessels at least are spasmmodically contricted in the hot stage, for no fluid is poured out. Here, however, it should be observed, that although the poverty of language, which compels us to borrow the terms of mechanical science, in speaking of the phenomena of fever, may render the use of such a word as contraction admissible; yet it is not from a mere mechanical contraction and relaxation of the extreme arteries that the peripharal and other secrete fluids pass off. These fluids are not pre-existent in the blood, and separated as through a sieve, but are produced by new combinations, effected by an unknown and inexplicable action of the secreting extremities of the vessels; this action is interrupted by various conditions of the vessels, by their over dilatation, it would seem, as well as by their collapse; and we are ignorant of the precise form, the vein, as well as the nature and extent of its modifications.

That the supposition of spasm is equally gratuitous in both cases; and the word concretion is only to be considered as expressing, by an incorrect analogy, the non-appearance of the fluids to be discharged. The contraction of the vessels in the cold stage, and their dilatation in the hot, are equally to be considered as part of the concourse of the symptoms, and yet an essential cause of the fever.

The hypothesis, which ascribes the spasm of the extreme vessels in the cold stage, as the cause of all the following symptoms, is not merely gratuitous, however, it is also inconsistent with the various phenomena of fever. This inconvenience seems to have arisen from the assumption of a simple intermittent or ephemeral paroxysm, as the prototype of every form of fever. But in many of the forms of pyrexia, and even of idiopathic fever, there is no evidence of the existence of this spasm. The cold, it is true, generally utters in the paroxysm of an intermittent; but it is often scarcely possible, in that of a remittent, and in various cases of continued fever it does not appear at all; so that the effect occurs without its imagined cause.

Besides, there is often no proportion between the two; the cold stage may be short and slight, when the succeeding hot stage is long and severe, and vice versa. Even admitting, with Dr. Cullen and Dr. Fordey, that continued fevers are but a series of paroxysms, following each other, and generally dilatated divided by exacerbations and remissions, yet a cold stage does not occur to introduce the exacerbation, and consequentially the succeeding phenomena are not the result of a spasm or cold fit. A degree of pyrexia, marked by heat, quick pulse, oppression, languor, &c. is often produced by various stimuli, such as much heating food, or drink, exercise, &c., but the cold stage is wanting.

We may conclude, therefore, that the occurrence of the heat, and its concomitant phenomena in fever, depends upon some other principle in the animal economy, and is upon the existence of a cold stage, and its impotent spasm. As well, indeed, might we fix upon the heat as a cause of the phenomena, which, in continued fevers, succeed it; such as the delirium, prostration of strength, &c.; and in truth, the omission to notice the influence of the morbid heat upon the future progress of the symptoms constitutes, as Dr. Currie has justly remarked, an imperfection in Dr. Cullen's theory. For it is certain, that the accumulation of the heat itself is a source of much irritation to the vasaferous and nervous systems, as is proved by the relief which follows the abstraction of it by means of cool air, and the application of cold water to the skin; for as the heat is decreased, the pulse immediately becomes less frequent, head-ache and restlessness are diminished, sleep is induced, and even peripharal is excited.

We have yet to add, that the idea of a proximate cause, implies that, which being present, the disease is present, and being absent, the disease disappears. Now, the cold stage is only present during a small part of the progress of fever, which is another reason for considering it only as one in the concourse of the symptoms.

The Brunonian Theory.—We have already given a brief view of the system by which Dr. Brown attempted to explain all the phenomena of the living body, whether health or disease (see Excitability); and the various modifications of fever were of course included in that explanation. The increasing number of facts, which the proper study of the animal economy after the time of Hoffmann produced, enabled the pupil to advance a step beyond his master in generalizing those facts; and it cannot be doubted, that some of the dogmas of Brown were the result of a legitimate induction, and therefore none of his principles were more just than those of Cullen. But like most theorists, he overstepped the boundary of observation, and involved himself in hypotheses, to which he made facts bend by misrepresenting them. Fevers, like all other diseases, are attributed to debility, direct or indirect; and he affirms "that the distinctions that physicians have made about the differences of fevers are all without foundation, and that they are all the same, with no other difference but in degree, and that, unless in that respect, they do not differ from other diseases of the same form." (Elements of Medicine, § 66. note m.) But he does not attempt to explain how the various succession of symptoms results from the state of debility, or how the various modifications of the pyrexia are to be accounted for upon this principle. The only approximation to such an explanation, that we have been able to discover, resembles the one given by Dr. Cullen, inasmuch as it is little more than an enumeration of the leading changes in the symptoms, but less explicit than that of Dr. Cullen.

We are told, that "the debility during the cold stage is the greatest, that of the hot stage, and that of the sweating stage which ends in health for the time, is the least of all. Hence in a mild degree of the disease, as cold is the most hurtful power, its effect is gradually taken off by the agreeable heat of the bed or of the sun, and the strength thereby gradually drawn forth. The heart and arteries, gradually excited by the heat, acquire vigour, and, at last, having their peripharal terminations excited by the same stimulus, the most hurtful symptom is thereby removed, the heat fit produced, and afterwards the same process carried on to the breaking out of sweat." (§ 606.) We are further told that "the cause of all these diseases (i. e. fevers, from the simple and intermittent to the gallo-fever and the plague,) is the same with that of diseases not debile, to wit, debility: differing only in this, that it is the greatest debility compatible with life, and not long compatible with it." (§ 672.) It may appear strange that a theory so vague and implicit...
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Explain should have obtained the number of admirers, which the doctrines of Brown have everywhere gained. The most rational of its advocates however, Dr. Wilson, who has striped the system of many of its errors and insufficiencies, is not content with these general terms, has stated the proximate cause of fever, according to the Brunonian principles, to be "a change in the laws of excitability, in consequence of which the same agents no longer produce the same effects." That is to say, the same external agents, food, light, exercise, &c. which is healthy produce moderate excitement, in fever produce excessive excitement. He adds, however, "how the remote causes of fever act in inducing this change, and on what cause in the living body this change in the laws of excitability depends, we neither can, nor ever shall be able perhaps to determine." (Treatise on Febrile Diseases by A. Phillips Wilson, &c. vol. i. p. 559.)

Upon this statement, it is only necessary to remark, that Dr. Wilson has fallen into the error which is common in the discussion of proximate causes, that of mistaking the symptoms for the disease itself. The change in the law of excitability is but a general expression for the change in the phenomena of the individual life, i.e. for the symptoms of the fever; whereas, the change in the living body is, in fact, the effence of the disease, i.e. the proximate cause of the symptoms, which he despairs of investigating successully.

Dr. Darwin's Theory.—In the theory of this ingenious physician, the phenomena of fever are referred to those laws of organic life, which he has deduced with great acuteness from a comprehensive view of the phenomena of the living system. His theory, indeed, is much involved in the obscurity of the language, which he has chosen to adopt; it is, occasionally perhaps, aided by fancy, where observation was deficient; and it is given by his author "rather as observations and conjectures, than as things explained and demonstrated:" but it appears to afford a glimpse of the true explanation of the concurrence of symptoms in fever, under its various forms: "a foundation and a scaffolding," to borrow the author's words again, "which may enable future industry to erect a solid and a beautiful edifice." (See Zoonomia, or the Laws of Organic Life, by Erasmus Darwin, M.D. &c. Clive &c. Supplem. ad fami.) Dr. Darwin's system is founded upon the same fundamental principles, as those of the Brunonian school (see Excitability); the inferences of which, however, he not only in a great degree avoided, but he likewise introduced a principle, which had been overlooked by Brown, namely, the principle of association, or sympathy, by which, doubtless, many of the actions of the living body are regulated. It is upon the observation of this principle, that the Darwinian theory of fever is chiefly constructed; whence the author gave it the title of the "Sympathetic Theory of Fever." Two general laws of the animal economy are flated by Darwin, as well as by Brown: 1. That all excitation or action of the living organs and functions occasions a diminution or exhaustion of their power (excitability in the language of the latter, senforial power in that of the former) according to the degree of excitation; 2. That rest, inactivity, or the abstraction of the usual stimuli, render those organs more susceptible of the action of the stimuli subsequently applied. Thus, when a small part of the capillary vessels of the skin are exposed for a short time to a cold medium, as when the hands are immersed in iced water for a minute, these capillaries become torpid or quiescent, owing to the abstraction of the stimuli of heat. The skin then becomes pale, because no blood passes through the external capillaries, and appears shrunken, because their sides are collapsed from inactivity, not contracted by freezing; the roots of the hair are left prominent from the feeding or subdigesting of the skin around them, and the pain of colds is produced. But in this situation, if the surface degree of warmth be applied, these vessels regain their activity; and, leaving now become more irritable from an accumulation of the senforial power during their quiescence, a greater action of them follows, with an increased glow of the skin, and another kind of pain, which is called the hot-ache, seizes. Here we see an epitome of simple fever beginning in the vascular system. When the same operation goes on more generally, as by immersion in the cold bath, the cold fit succeeded by the hot fit is more general, and both may be increased and prolonged by continuing in the bath, which has indeed proved fatal to some weak and delicate people, and to others who had been much exhausted by heat and exercise; the same torpor and subfrequent orgasm having extended to the heart and great vessels.

Thus far the two theories nearly accord; but beyond this point the Brunonian doctrine leaves us to a general statement of debility, altogether inadequate to account for the various forms and phenomena of fever. But Dr. Darwin appeals to other established facts in the animal economy, upon which these varieties appear to depend. From these a third general law may be deduced; namely, 3. That the functions of different parts of the system are so far connected, or associated with each other, as it were in circles, either from direct connection in structure, from the habit of acting together, or more frequently from causes at present inferable, (see Catenation,) that an increase or decrease of the action of one organ follows or accompanied by an increase or decrease of the action of another; sometimes by a similar change, that is, inerased followed by increase of activity, or decrease by decrease; but occasionally by the contrary change, that is, increase followed by decrease of activity, and vice versa in the associated parts. The former of these is termed a direct sympathy; the latter a reverse sympathy. The influences of sympathy between different parts of the animal frame are very numerous. To the medical reader it were sufficient to mention the sympathies in the functions of the stomach and brain, the stomach and skin, the stomach and heart, the brain and heart, the skin and lungs, the uterus and mammary, &c.; but for the unprofessional reader a brief illustration may be requisite.

The sympathetic action of the stomach and the brain occurs perpetually to the obervation of the physician. Thus indigestion, however induced, is frequently the cause of headache; and head-ache, dependent upon certain faties of the brain, produces los of appetite and sickness, as is hydrocephalus. We have also influences of both direct and reverse sympathy between these organs; for when the action of the vessels of the brain is languid and feeble, as in approaching syncope, nausia and loss of appetite occur in the stomach, in which case the sympathy is direct; but when the vessels of the brain are acting with increased power, as in phreny, nausia and loss of appetite are likewise induced, in which the sympathistic action is reversed. Similar sympathies occur between the stomach and skin. Thus, moistening the skin relieves thirst, as we have already stated; and a copious draught of warm liquor will often at once produce a periperation on the skin. We have seen that Dr. Cullen attributed the symptoms in the digestive functions in fever almost entirely to such a sympathy; and that Sydenham removed sickness and vomiting by exciting periperation. The stimulating influence of food on the nerves and vessels of the stomach generally excites, by direct sympathy, the

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erves and vessels of the skin, and produces a glow on the surface; but in certain debilitated constitutions, or states of the constitution, the same stimulus in the skin occasion, by reverie sympathy, a chilliness, even a shivering, and paleness of the skin. Exposure to a cold atmosphere (which abstracts the stimulus of heat) occasions an increase of appetite and of the digestive power, in strong habits; but the same exposure often destroys the appetite, and produces even nausea, in feeble constitutions; these may be considered as instants of direct and reverie sympathy; or perhaps both as instants of direct sympathy, the fenorial power accumulating in the strong constitution, and producing increased action of the cutaneous vessels; but not in the weak. The actions of the skin and hot and large arteries, the fever-fit becomes more complicated and dangerous. And again, when the fever commences, from the operation of other exciting causes of fever; in other organs of the body, and extends, with the subsequent organ, by direct or reverie sympathy, to the organs associated with them, other various forms and modifications of febrile disease are produced. Thus, if the skin is affected with fever, either primarily, as from the action of contagion, feverish, by the sympathy with the cutaneous capillaries, and by incrustation, or the irritation of a tissue in the kidneys, may be considered as examples of a reverie sympathy between those organs. There are many instances of the sympathy of parts connected by structure, or by the habit of acting together. Thus, the irritation of a flame upon the neck of the bladder produces an action of the lower gut, with a fruitful effort to stool, denominated tenesmus; and, vice versa, a tenesmus, as in dysenteric for instance, often excites a degree of strangury or fruitful effort to pass urine. In the same way, not only will a purgant odour, affecting the nostrils, excite tears, but the sudden impulse of strong light upon the eyes very frequently excites fasting; which may be observed daily in the streets of London, during the summer, in persons who suddenly receive the reflected light from a white pavement, as they pass from a shade. This also sympathetic pains of the mamma occur in disorders of the uterine, which organs are connected in the functions and purposes which they serve in the animal economy. See SYMPATHY, and CATATONIA.

These three laws or principles of action in the animal economy, then, 1. The exhaustion or diminution of the fenorial powers by exertion; 2. The recovery or accumulation of the same powers, during quiescence or impaired action; and, 3. The direct and reverie association of parts, by which the actions of one part give rise to actions in others, are the grounds of Dr. Darwin's explanation of the phenomena of fevers. We have seen how the cold and hot fits of simple fever are produced, from the external influence of cold; the first by the torpor of the capillary vessels, from the abstraction of the stimulus of heat; the second, by the renovative activity of the capillaries from the accumulation of fenorial power during that torpor. Dr. Darwin, however, remarks, that this renovative activity of the capillaries is not owing to the renewed action of the heart, which forces them open by the mechanical impulsion of blood; that the action of the capillaries often recommences sooner than the action of the heart, these vessels having a greater mobility than the heart and large arteries, as appears in the sudden blush of shame; and that, in low fevers, the capillaries acquire increased strength, as is evinced by the flush and heat of the skin, while the pulsations of the heart and arteries remain feeble. Hence simple fever is of two kinds; in one the pulse is strong, in the other weak; in the fever with strong pulse, not only the cutaneous capillaries, but also the heart and arteries readily acquire a greater activity by the accumulation of fenorial power during the torpid state, which last is further increased by direct sympathy with the increased activity of the capillaries; this happens in strong fevers, and is often seen in small intermittents; in the fever with weak pulse, on the contrary, the heart and arteries do not acquire much increase of fenorial power, but continue in some degree in their state of torpor, while the organ of the capillaries is produced, whence there is a hot fit, with feeble pulse. But when the sympathies of other parts of the system are called into action, together with this torpor and organ of the cutaneous vessels, and of the heart and large arteries, the fever-fit becomes more complicated and dangerous.

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fenoral powers of the stomac, heart, and brain, are pri-

marily exhausted by narcotic poisons, as by digitalis, to-
bacco, and contagion, (which both Brown and Darwin
consider, perhaps erroneously, as exhausting by excess
of stimulus,) these organs are longer in recovering their exi-
tability, than when they suffer from defect of stimulus, or
secondarily, from sympathy with the capillaries of the
skin, or of some other organ. From either species of ex-
haustion the fenoral power in voluntary or involuntary
muscles might be removed by a short quiescence; but with
the heart to rest is death: whence that organ recovers more
slowly, and thus produces fever with weak pulse. The
organs which are in perpetual action, indeed, being en-
dowed with a greater abundance of vitality, recover their
fenoral powers in the same proportion more readily; other-
wise life could not continue. As the fenoral power accum-
ulates, the actions of those organs increase; whence a de-
gree of inflammation often occurs in the brain and its mem-
brane, accompanied with flushed countenance, redness of
the eyes, and delirium, sometimes followed by stupor; or
a similar inflammatory action occurs in the stomac, or in-
testines, or in the lungs, or the heart. Thus, however,
are generally secondary effects of low fever, but death is
f seldom produced without such an occurrence in none of
those vicera. Dr. Darwin judiciously considers the painful
or uneasy feelings, or (to use his language, the fenoral power
of sensation,) excited especially when inflammation takes
place, as contributing farther to augment the actions of the
heart and arteries, and of all the moving sytem along with
them; whence the pulse, under such circumstances, ac-
quires a degree of sharpness in its stroke, unobserved in
health.

When the stomac is secondarily affected, and the torpor
is primarily produced in some other vicera, the actions of
which, on the restoration of the fenoral power, are aug-
mented to the degree constituting inflammation, and of
course pain, or the fenoral power of sensation is also ex-
cited; as in pleurisy or perипneumony, the heart and arteries,
not having been exhausted by a narcotic power, as by con-
tagion, soon resume a strong action, the pulse becomes
hard, and the disease is termed an inflammatory fever, or
plegmania. "Thus," says Dr. Darwin, "the perипneu-
mony is generally induced by the patient respiring very cold
air, and this especially after being long confined to warm
air, or after being much fatigued and heated by excessive
labour or exercise. For we can cover the skin with more
clothes, when we feel cold; but the lungs, not having the
perception of cold, we do not think of covering them, nor
have we the power of covering them, if we defined it; and
the torpor thus produced is greater, or of longer duration,
in proportion to the previous expenditure of fenoral power
by heat or exercise. This torpor of the lungs affects the
skin with shuddering, and the stomac is also secondarily af-
ected; next follows the violent action of the lungs from
the accumulation of the power of irritation, and an inflam-
mation of them follows this violent action, &c." (Loc.
cit. Suppln. 2. § 16. 7.)

The theory, of which we have thus given an imperfect
account, stripped of the peculiar phraseology of the author,
appears to us incomplete, as it confecutively is, to afford an
approximation to at least a more comprehensive and more
confident doctrine of febrile disease, than any that has yet
been promulgated: more comprehensie, because it not
only includes the varieties of idiotopathic, but also of sympto-
matic fevers; while other hypotheces scarcely embrace more
than one form of the first, namely, the ephemeral, or in-
termittent paroxynm, and have dwelt too much upon some
particular symptom, as the cause of the whole disease, such
as the heat, the cold fit, or the quick pulse; and more con-
flident, because it is derived from those laws of the animal
economy, which have been deduced from the observation
of the general operations of life, both in health and disease.

To the language, however, many objections arise, as well
as to several collateral statements, which are employed in
filling up the outline, which we have drawn: such as the
notion of a retrograde action of the animal, of the ab-
fortion action of the capillary veins, of the excessive stimu-
lus of digitalis, and the matter of contagion, &c. are not essential parts of the doctrine. We shall now pro-
ceed to state briefly the principal points of another
theory of fever, lately published, which, from the erudition
and practical knowledge with which it has been maintained,
is entitled to consideration. We allude to

Dr. Clutterbuck's Theory.—Fever has usually been called
a general disease, affecting all the functions, in contra-
distinction from local diseases, in which some particular
organ is the primary seat of the disorder, and the affections
of the other functions are secondary, or symptomatic. But
Dr. Clutterbuck denies the existence of general disease,
and maintains that all general or extensive derangement of
the animal sytem is referrible to local derangement, in some
one organ. "The organ universally affected in all the
varieties of idiopathic fever which differ but in degree,
as well as in those which arise from specific contagion, as
malignant fore throat, scarlet-fever, small-pox, &c. is, in
the author's opinion, the brain. This is manifest, he contends,
from the symptoms as the expulsion of the strength, and other derangement of the animal functions, the
delirium, the tremors, failure of vision, &c. It is manifest
from the nature of the remote causes which act chiefly
on the brain and nervous sytem, as intoxication, fear, grief,
and other passions, external irritation, not to mention malad-
ies and contagion, of the operation of which we are igno-
rant; as well as from the predisposing causes, which probably
confer in a deficiency of sensibility, as in idiots, negroes,
old people, and infants: but it is more particularly mani-
fested from the consequences of fever whether after recovery,
or after death, ascertained in the latter case by dissection.
Among the consequences of fever, which are not uncommon
after recovery, are an impaired condition of the senses; such
as deafness, imperfect vision, deprived talk: paralytic efeeti-
ons, or convulsive contusions, as epilepsy and chorea; derange-
ment or loss of the mental powers, such as melancholy,
great irritability of mind, loss of memory, or even complete
fatuity. The consequences, observed by dissection after
death occasioned by fever, are frequently visible disease
of the brain, of which several examples are quoted by
the author. He then proceeds to shew, that the local af-
fecition of the brain, thus manifest, is in fact inflamation
of that organ; or that fever, therefore, "is nothing less than
a species of phrenitis, or topical inflamation of the brain,"
and should be arranged in the order of Plegmanias, with
pleurisy, enteritis, and other symptomatic fevers: but as
phrenitis has been generally applied to a particular form
of inflamation of the brain, and implies delirium, which does
not always occur in fever, although it is a frequent sym-
ptom, Dr. Clutterbuck proposes the term Encephalitis
as the denomination for fever. The arguments adduced in
proof of the notion that the topial affection of the brain,
in fever, is inflamation, are, 1. The analogy
between the symptoms of fever and those of inflamation,
eis. pain, heat, throbbing, acute sensibility, &c. being
common to both; 2. The occasional bull of the blood in
both; 3. The similitude of several of the exciting causes of
both;
both; 4. The occasional alternation of fever with inflammation; 5. The analogy in regard to the cure of the two diseases generally, as by means of blood-letting, vomiting, sweateing, purging, blistering, and the application of cold; 6. The symptoms of fever not being distinguishable, on the whole, from those which belong to phrenitis, as described by authors; 7. That the morbid condition of the brain, discovered by dilatation, is such as implied previous inflammation. (See an Inquiry into the Sent and Nature of Fever, &c. by Henry Clutterbuck, M. D. 1807.) The author has illustrated these arguments at considerable length, with great peripeties; and with an ample collection of facts and observations, compiled from the records of medicine, but our limits confine us to a mere sketch of the general doctrine, and to a few observations relative to its apparent solidity and truth.

In the first place, Dr. Clutterbuck, like other theorists enamoured of a favourite doctrine, appears to have laid too great stress upon those phenomena which support that doctrine, and to have concealed facts to opposing facts, than they are entitled to claim. Hence, in retracing the delineations of fever, in the words of the most creditable writers, he has distinguished by italy all those signs which indicate derangement of the encephalon, by which they are made to stand the most prominent features in the picture. Hence, also, he has assumed the position, that the derangements of the natural and vital functions, which are nearly, if not altogether, as universal concomitants of fever, as the disorders of the animal functions, are, nevertheless, in all cases, secondary symptoms, originating from the primary affection of the brain. Thus then the vomit, the total loss of appetite, and of the digestive power, are believed to be always sympthetetic of the affection of that organ; so likewise is the quickened action of the heart and arteries, and of the respiration. That this, however, is a gratuitous assumption may be shown, 1. By attending to the very histories which Dr. Clutterbuck has quoted, in which the occurrence of the deranged condition of the stomach is as constantly mentioned, as that of the disorder of the encephalon; 2. By observing, that the sympathy between the brain and the stomach is perfectly reciprocal; so that the brain suffers in sympathy with the stomach, not less manifestly than the stomach with the brain; and, 3. By remarking, that the symptoms of disorder in stomach are capable of being relieved or removed, while the supputed cause (affection of the brain) remains; the thrill being allayed, and the sickness removed, by changing the state of the skin only, the former by moistening it with water, the latter by exciting sweat, as observed by Sydenham. Whence Drs. Cullen and Darwin seem to be rather justified in attributing the derangement of the stomach, when it is affected secondarily, more frequently to its sympathy with the state of the skin, than of the brain.

Further, the connection of many of the leading symptoms with some disorder of the brain, or common febrorum, is admitted by all, and equally favours the hypothesis of the other authors, as well as that of Dr. Clutterbuck; since whether the brain be primarily or secondarily affected, certain phenomena in the nervous system must necessarily ensue. We have just stated some reasons for believing that it is often thus secondarily affected; and it now remains to offer those reasons for supposing that inflammation of the brain, when it occurs in fever, (to which we cannot consider it essential,) is commonly secondary likewise.

The first symptoms of the affection of the brain are by no means those which indicate inflammation or weal excitement of the menaphron; on the contrary, they are such as indicate an opposite state, which Dr. Cullen has termed ataxy and collapse, and Dr. Darwin torpor: the head-ache itself, according to the observation of Dr. Fordyce, is altogether distinct from the head-ache of inflammatory excitement, or of the hot flag. Any symptoms that can be interpreted as indications of local inflammations, such as redness of the eyes, protrusion of the features, flushed countenance, throbbing of the arteries, and even delirium, are the appearances belonging to a sublunary period of the fever. But at this sublunar period, inflammatory congements are liable to occur in the other viscera, if not frequently, at least, not unfrequently; as in the stomach, for example, the intestines, the lungs, and other organs. This fact has been noticed by many physicians of accurate observation. Riverius long ago remarked that acute and malignant fevers fearely ever occur unaccompanied by inflammation in some one of the viscera; and he has stated in another place, in most difficult cases, that we ought affiduously to recollect, that all those fevers, with which local inflammation is conjoined, are not symptomatic, but often idiopathic, and that the inflammation supervenes, not being the cause, but the consequence of the fever; "qua febrem istam non efficat, sed illi potius sequaxit aet. Thus, he adds, "we frequently observe, in practice, that patients labour under continued fever for a day or two before pain of the side and other symptoms of pleurisy appear; and thus many persons on the third or fourth day of fever fall into inflammation of the brain, &c." " Sic nobis frequenter in usu practico videre licet aegrotantes, ab initio febri continua laborantes per unam aut alteram diem, antequam dolor lateris et alia pleuritis signa appearant: sic multi tertia vel quartae febris dies in phrenicidem incident, &c." (See River, Prax. Med. lib. xvi, cap. 1.) Dr. Donald Monroe, whose testimony on subjects of morbid anatomy is of considerable weight, with Dr. Clutterbuck, remarks, when speaking of malignant fever, that this fever occasions in general a more or less redness (I do not know that we can properly call it true acute inflammation) of the membranes; and the febile matter is apt to fall on particular parts, and there to create abscesses, particularly in the brain, the lungs, and the glandular organs." (See his Treatise on Military Hosp. vol. i. p. 237, and Dr. Cullerbuck's Treatise, p. 172.) Observations to this effect might be easily multiplied, and we have already enumerated several in a former part of this article. It is somewhat singular, that Dr. Clutterbuck, who quotes the remark of Dr. Monroe, should deem it favourable to his hypothesis of exclusive inflammation of the brain; since it obviously proves an equal liability to inflammation in other organs, if it proves anything. Now, it must be admitted, that, if fever depends upon inflammation of the brain, and is merely symptomatic of such a state, this state must be always present, when the symptoms of fever occur; one clear negative example is fairly fatal to the theory. Dr. Beddoes collected a considerable quantity of evidence from the histories of diseases, made during the prevalence of several epidemic fevers on the continent, from which it is proved, indeed, that congestion, or some other morbid appearance was frequently observed in the brain or its membranes; but it is also shewing that abscesses, gangrene, or other marks of inflammation, were not less frequently found in the viscera of the thorax and of the abdomen, especially in the stomach and liver. These facts we have detailed, when speaking of the consequences of fatal fevers, as discovered by dilatation, and it is unnecessary to repeat them here. Dr. Beddoes is fairly led (supposing the facts accurately reprented) to this inference, that in idiopathic fever, the stomach and contiguous parts have been found more constantly and more deeply affected with
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(ACUTE, AGUE, and REMITTENT.) In the syphochna, or inflammatory fever, this is the principal indication to be followed; in the syphochois, or sub-inflammatory fever, it is the rule of practice in the greater part of the disease; and even in typhus, originating from contagion, it is equally necessary to be kept in view in the first days of the complaint, and partially for a longer period. We are not in possession of any means, by which we can with safety effect a direct diminution of the actions of the animal system in fever: our measures, therefore, are limited to a negative or indirect reduction of excitement, by withdrawing or diminishing those irritations or stimuli, which are constantly applied to the body, in one degree or other, and actually excite the actions of life, (see Excitability,) or which are more particularly the consequence of the febrile state. Of the irritable of these irritations, the ordinary impressions made upon our senses, the exercise of the body and mind, the use of food and drink of various qualities, are examples; of the latter, the excessive heat, the thirst, and the various painful sensations, &c. The system of avoiding these as much as possible, or of moderating their force, when that is impracticable, constitutes what has been called the antiphlogistic regimen, which it is requisite to pursue in almost every continued fever. Although the latter is generally regarded as the more dangerous, yet it is by no means falutary, and support the activity of the living body; yet, in the febrile state, when the body is more capable of the operation of stimuli, on the one hand, and more feeble, (in typhus at least,) and therefore less capable of bearing their action, without suffering exhaustion, on the other, they become exceedingly prejudicial.

1. In the hot stage of fever, the senses are generally more acute, and the ordinary impulses excite a painful irritation, and thus contribute to augment the vascular action, and to increase head-ache, repletion, &c. Hence the obstruction of too much light is to be prevented, all noises are to be excluded, and such covering, or bed, to be employed as is least uneasy to the body of the patient. In large towns, fluffing the ears with cotton may perhaps more effectually lessen the effect of noise than laying straw in the street. But no impression is to be more carefully guarded against than that of external heat; while at the same time every other means of increasing the heat of the body is to be shunned. Both these precautions are to be observed as soon as a hot stage is formed, and the patient is hourly commencing. In this state, the more the morbid heat is augmented, the more necessary this attention becomes, since the uneasy sensations connected with it are the constant cause of increase to all the other symptoms. This is not less evident, than the general and speedy relief which follows the abatement of this morbid irritation, i.e., in the common phrase, the application of cold. Yet it was formerly a universal practice, to augment the heat in the early stages of fever, in spite of the instinctive feelings of the patient; partly under a notion, that sweating might thus be produced, and a crisis accomplished; and partly from an hypothetical opinion, that heat contributed to accelerate the process of concoction, and therefore to shorten the fever. Our countryman, Sydenham, was one of the first to point out the advantages of a contrary practice, which he adopted when the rest of European physicians were pursuing the hot regimen. The fame notion of the humorists, and with others, the fear of the subfequent debility and prostration of strength, which occur in the latter periods of typhous fever, and the doctrine that debility is the proximate cause of the disease, have also contributed to conjoin with this a stimulating mode of treatment, in fevers of this character; so that some practitioners no sooner hear the name of fever, especially when the epithets putrid, contagious, malignant, &c., are connected with it, than they immediately ply the patient with wine, Peruvian bark, and other stimulants and cordials, whatever be the period or circumstances of the disease, for the purpose of obviating or anticipating the consequences of debility. This the experience of all enlightened and unprejudiced physicians of the present day, condemns as a pernicious error, in the early stages of fever, when there is a dry heat on the surface of the body. For not only is the general vascular action, and with it the head ache, delirium, thirst, repletion, &c., directly augmented, but they are also indirectly increased by the increase of the irritation of superficial heat; and the very debility, which is intended to be prevented, is, therefore, actually accelerated and augmented, in consequence of the exhaustion which over-excitement induces. Thus petechiae, and other signs of putrefaction (as they have been termed,) were common results of the hot regimen; which, on the other hand, was inadequate to produce a crisis by sweating, or to shorten the febrile state by concoction, as we shall presently state.

The reduction of the morbid heat, then, constitutes an important part of the system of avoiding irritation. It is accomplished by external and internal means, by the external cooling of the application of cool air, or of cold or tepid water to the surface of the body, and by surrounding the patient with light clothing, by which the animal heat is not accumulated; and the internal, of cold drink; and perhaps of what have been denominated refrigerant medicines. The human body evolves a sufficient quantity of heat to preserve its regular and agreeable temperature, in so rare a medium as the air, when the temperature of this is not under 62° of Fahrenheit's thermometer, or unless it contain moisture; and in air at 62°, the caloric disengaged from the body is neither carried off, nor permitted to accumulate so as to become unpleasant. But if more caloric be disengaged than in health, a lower temperature will be required for its due ablation, in proportion to the greater heat and strength of the patient. A temperature of the air in his apartment of between 45 and 55 degrees will be the most grateful, perhaps, in the ordinary forms of typhus. In the syphochna, in which the temperature of the body is higher, the patient's bed-room may be kept as low as 45° or 50° with advantage. In this country, the former temperature is very commonly attainable; if the heat of the atmosphere be higher, the evaporation of watery fluids, sprinkled upon the floor or other parts of the bed-room, especially such as are impregnated with the essential oil of aromatic plants, contributes somewhat to reduce the temperature, and feels refreshing to the patient. The free admission of pure air is at all times necessary, not only as producing evaporation and consequent coolness, but as carrying off the morbid effluvia arising from the body, and affording a pure pabulum for respiration; of which we shall have occasion to speak hereafter. The late Dr. Gregory, father of the present professor at Edinburgh, used to remark, when he had been visiting one of the richer classes of people in fever, that if he had the patient in a cool ward of the infirmary, he could ensure his recovery; whereas, from the mere circumstance of the heat and depression of the apartment, which he could not regulate according to his wishes, he would in all probability, find the symptoms of the fever increased at his next visit. The writer of this article has frequently experienced the great and obvious benefits of a cool and well ventilated room, independently of medicine. He has visited patients, who had applied for admission into the House of
Recovery, in their own close and suffocating apartments, and found them in a state of delirium, with dry black tongue, great heat, and other bad symptoms; having directed them to be removed to the House, he has found them cool and perfectly collected, with other symptoms of equal amendment, on the following morning, from the mere influence of a cool bed, and an airy apartment.

Another mode of reducing the morbid heat is the application of cold or tepid water to the skin. As the fever is now supposed to have advanced beyond the fourth day, after which period a complete solution of it is not to be expected, either the cold infusion may be employed, or the surface of the body may be washed, by means of a sponge, with cold or tepid water, or tepid water may be used in the way of application. The same precautionary rules, as we have already stated, are to be observed in regard to all these modes of the external application of cold water. The tepid infusion (i.e. of water heated to that degree which is warm, but not hot to the sensibilities, or from 87° to 97° of the scale of Fahrenheit) produces a cooling effect, equal to that of cold infusion, partly in consequence of a more speedy evaporation, and partly because it gives a cool, or re-acting, as it has been called, does not succeed. "Where the object is to diminish heat," Dr. Currie observes, (Reports on Water, vol. i. p 69. chap. x. 2d edit.) "that may be obtained with great certainty by the repeated use of the tepid infusion, suffusing the surface of the body to be exposed in the interval to the external air; and if the beams of the sun be excluded, and a stream of wind blows over it, the heat may be thus reduced where cold water cannot be procured, even in the warmest regions of the earth, on the plains of Bengal, or the sands of Arabia."

The effects of the infusion of tepid water on the skin are thus enumerated. "It very generally produces a considerable diminution of heat, a diminished frequency of the pulse and respiration, and a tendency to repose and sleep. I have also used it in feverish disorders of various kinds where the lungs are oppressed, and the respiration laborious, and where of course the oppression might be dangerously augmented by the sudden influx of the cold infusion. It is also applicable to every case of fever, in which the cold infusion is recommended, and those may receive much benefit from it whose fears or whose feeblestheens deter them from that energetic remedy. I have not, however, found its effects so permanent as those of the cold infusion, and I have never seen it followed by the total cessation of regular fever, as often occurs after the cold infusion." (Currie, loc. cit.)

Where the infusion of cold or tepid water is not employed in fever, benefit may be derived, though in an inferior degree, by plunging or wetting the body with cold or warm water, or vinegar and water. According to Dr. Currie's experience, however, it is not only less effectual, but in many cafes less safe; for the fyllem will often bear a sudden, a general, and a stimulating application of cold, when it shrinks from its flow and successive application. In the House of Recovery belonging to the Fever Insitution of London, all these measures have been constantly employed according to the circumstances of the patient, as pointed out by Dr. Currie, and relief has been invariably the result; no individual remedy, to which we have referred, has appeared to produce so prompt and decided a diminution of the febrile symptoms; which, though often temporary only, is in many cases permanent, and renders the future course of the disease apparently milder and shorter, than it would otherwise be.

The fation of thirst is another irritation, which is often very distressing in fever. In this instance, as in that of extreme heat, the instinctive feelings of the patient direct him to the source of relief; to sipple diluent drink in the one case, as to exposure to cool air, or immersion in water, in the other. Had not the rage for hypothesis for ages, blinded the practitioners of medicine, the obvious proprieties of the constitution could not have been so long and so obstinately thwarted, nor the gross inconsistency have been committed, of acknowledging the superintendence of nature, her salutary and healing exertions, her vis medicatrix, yet of counteracting her instinctive dispositions and operations with so much industry. Thus, drink, as well as cool air, has been denied to patients in fever by some physicians, and, when allowed, was directed to be given warm, notwithstanding their desire for it cold. The ancient physicians, indeed, with whom observation on the whole was paramount to hypothesis, generally admitted of a free use of cold drink: Galen considered it as a most important remedy in fever; and Avicen, Rhazes, and others of the Arabian physicians, were more indulgent in this respect than the Greeks. Nevertheless, Aetius recommended total abstinence from liquids until the thirst was greatly augmented, and then to allow it to be fully gratified by copious draughts of cold drink. Celsus also recommends the use of copious cold drink in the height of the fever, "but not before the fourth day, and after great thirst." (De Medicina, lib. iii. cap. 7.) "In the article of drink," he says, in another place, "the struggle is great, and that in proportion to the severity of the fever; for this inflames the thirst, and demands water most importantly, when it is most dangerous." (Lib. iii. cap. 6.) After the revival of learning, when the Galenical hypothesis of concoction was universally adopted, cold drink was generally prohibited until the fever had attained its acme, under the notion that it increased the cruelty of the fluids, and prevented the progress of concoction; "verum materiam morbi incassando, atque istus includendo," says Lommius, "longe facere coetiones rebelliorum, itemque measus, quibus ea tandem vacuari debet, obtinuere." (Lommi. de Febris contin. curandis, sect. iii. cap. 2.)

The conclusion, however, which common sense would deduce from a consideration of the instinctive proprieties of the constitution, is fortunately corroborated by observation and experience. Dr. Fordyce, after rejecting some arguments and slating some facts, upon this point, adds this remark: "the author, therefore, concludes, that as it is of no use to restrain the patient from drinking, as much as he pleases, or to compel him to drink more than he chooses, so it is of no use to prevent him from drinking; it of the degree of heat that he likes best." (Third Dissertat. p. i. 211.) The absurd opposition to the intimations of nature, which many practitioners have been led to maintain by equally absurd reasoning, almost justifies a sarcasm of the late Dr. More, who said, that "between a good physician and a bad one, there was a wide difference; but between a good physician and none at all, the difference was very little." At present, however, the observation is not applicable, since the abstractions of former physicians are now adopted by the people at large, and one of the greatest difficulties which a practitioner has to encounter at present, is to prevent the mischief of popular interference, and to defend the operations of the constitution from popular interruption.

With respect to the use of cold drink in fevers, Dr. Currie ascertained that its safety and utility are dependent on the same principles, and that its administration is to be regulated by the same rules, as the external application of cold; namely, that when there is a steady heat of the surface,
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face, without any feafe of chillines, or a general perforation, it is safe and falutary, and attended by similar eftects, though generally left in degree, than thofe of the cold wafting. This principle was, indeed, long ago pointed out by Galen and others, though with lefs precision. The degree of corporal heat, the strength of the patient, the fummer fealor, &c. are flated by Lommius, from the ancients, as indicating the safety of cold drink. "Fidicem addunt, febris admodum ures, atas juvenilis, corpus boni habitus, firmorumque vicercum, atque his (ut fere fit) juncta vires, atas media, confuctudo. Ingens febris ardo riae noxia frigide impetum fulficet, &c." (Loc. cit.) The effects of cold drink, when copiously taken in the hot flage, as defcribed by the ancients, as by Actius, Cellus, &c. are sweating, a defipition to found sleep, and relief from the fever. "Poft que," fays the author juft quoted, after having mentioned the quantity of cold water drank (three or four pints), and occafional vomiting or diarrhoea produced by it, "reclinæ ac probe operti, max uberrimus ludoribus totas noticès vel etiam altimine dormientes, deliquerunt, quibus finitus, omnem in poterum aniferunt febridicationem." Cold drink is seldom employed, at prefent, to this extent; but a treatife was published in health, fome years ago, by the reverend Dr. Harney, of St. Stephen's, Walbrook, entituled "Fæbrifugum Magnum, or common water a cure for all fevers," in which he flates, that very copious draughts of cold water, drank at bed-time, at the beginning of fevers, invariably produced copious sweating, and a folution of the difeafe, in feveral cafes, which he has related. He was not, however, aware, that fuch a practice was only safe after the hot flage was completely formed.

2. Another irritation, which it is requisite to avoid in fever, is motion, efpecially that which requires the exerfice of the muclcles; and it muft be obferved, that every motion of the body is more fumilant and exhauting in proportion as the body is weaker. Hence that poffite is to be chosen which employs the fewelt muclcles, and which keeps none of them long in a state of contraction. In the horizontal poftion, the patient is supported in every part by the bed, and he is not obliged to exert many of his muclcles to maintain an equilibrium, as when in the erect pofture. Some muclcular exerfion is, however, required to be on one fide or the other, although it be imperceptible in health; there is further, in the extreme proflration of strength, in the left flage of fever, the patient invariably fides upon his back. Speaking, which as it also tends to accelerate reflation, fhould be particularly refrained from.

3. The exerfice of the mind add much to the ex- citemen of the body, more efpicially when there is con- siderable debility, as in fever, and when, therefore, the exerfice of the mental powers requires more exerfion on the part of the patient. Hence as foon as a febrile attack has come on, every circumstance that can lead to thought, and efpicially to fuch as is connected with anxiety, or may tend to excite passion or emotion, is to be carefully fhunned. It is fearely neceffary to warn the practitioner againft exciting anxiety in the mind of the patient about his difeafe, by making it the fubjeft of converfation in his preffen; but it fhould be inculcated to nurses and friends, and all unneceffary attendants and visitors fhould be excluded, that the fubjeft of buffines, and all other interefling converfation may be avoided.

4. A very important part of the antiphlogiftic regimen relates to the nature and qualities of the food and drink to be given to perons labouring under fever, particularly in the early periods of it. The prefence of recent aliment in the flomach always proves stimulant to the ftylum, and the more f0 in proportion to the quantity received, to the folidity of its texture, and therefore the difficulty of its digestion, &c.; in all these points the irritation ought to be moderated as much as poifible, confidently with the safety of the patient. In the beginning of continued fever no great quantity of nourifhment is immediately required, the fytem being able to support itself for a time, without any thing being thrown in to be formed into chyle and blood. Total abfolute from food, for the firft few days of continued fever, was much practiced by the ancients, who have left us a great many precepts respecting the regulation of the diet in febrile difeafes. A coniderable degree of abfolute in fact is rendered absolutely neceffary by the loss of appetite, and even avifion to food, which prevail through the greater part of the course of fever; but fome aliment be- comes requisite to prevent the patient from finking under the exhaustion of the difeafe. In the firft place, however, no principal meafure fhould be employed under thefe circum- fances, even were the organs of digestion capable of retaining a large quantity of food, or of converting it into chyle, on account of the irritation which it would induce: small quantities, therefore, fhould be given, and repeated more frequently than in health. In the fefcond place, no folid aliment ought to be given during the firft days of continued fever; however light. The eftect of fuch food, when taken, if the flomach do not altogether reject it, is to increafe the heat of the patient, not only to his own ten- fions, but ftil more to the feel of the by-fander, and fre- quently, though not always, to the thermometer; to increafe the frequency of the pulf and reflation; to excite great refleflleness and a fefte of nauseas, and to augment the deftility of strength, during the time that it remains in the flomach and intenines. In short, it totally deranges the fever, and often produces the appearance of a fresh paroxym. (Fordyce.) If the fame kind of food be per- fifted in, it increafes the evening exacerbations extremely, brings on delirium much more rapidly, and to a much greater degree than it would otherwife arife, and in very way aggravates the danger of the difeafe. Dr. Fordyce prides a farther caution strongly upon the attention of his readers: "even after the difeafe has been terminated by a crift," he fays, "animal food, in a folid form, fhould be rejected, there being no caufe which has produced relapfes, as far as the author has been able to judge, during the early days of continued fever. Only when the patient is using folid animal food too foon," from a notion that it would speedily reftrange the strength of the patient. And he properly fuggexts that under fuch circumfiances, the fever being gone, the deftility of strength no longer exist- ing, and no further caufe of weaknes remaining, "the patient, with very moderate nourifhment, and the feep and ref which are fo apt to cafe after the fever has been com- pletely carried off, will have his strength refored in a very fhort time, without using any thing that fhall run any risk of reproducing the difeafe." (Third Diflert. part i. p.184.) The moft proper nourifhment in fever, then, confifts of light, fluid, vegetable matters; efpecially the farinous furbances, coagulated by heat. Difterions of barley have been employed for this purpofe, as the simplest nourifhment, from the earliet ages; and the feeds of oats, or other fari- naceous grain, with the hulks removed, afford similar food by decoction in water. The various forts of vegetable flarch, which are prepared under the names of fago, tapioca, arrow-root, &c. under the fame purpofe of furnifhing aliment, which gives the heat definuent to the organs of digestion. The polenta of the ancients, which was compofed of a decoction of baked flour, or of bread twice baked, which we call rufles, was much recommended in acute difeafes. All vegetable furbances, however, are not to be employed indiscriminately as food, in fevers. Even the farinous
Fever.

Farinaeous substances, if dissolved in water, without being coagulated by heat or otherwise, afford a very viscid fluid, which is not easily digestible, and disturbs the stomach and the constitution at large: all such vegetables as cabbage, lettuce, green pea-fe, and the like, are to be rejected, on account of their disposition to run into the visous and aceto-us fermentations, which the stomach, having its powers depressed, is not strong enough to counteract; whence a considerable quantity of vapour is extricated, which diverts the stomach and intestines, and produces partial epiplectic contractions in them. All kind of food which is adhesive to the stomach produces irritation in the fylfe, such as strong solutions of gum Arabic, jellies, formed from the fle& of young animals, or from the membraneous parts, which should therefore be avoided. The fruits, especially the subacid or summer fruits, or such of them as, from containing less mucilage, are not so prone to fermentation, (Fordyce;) afford a light and agreeable nourishment, as grapes, &c.; those which consist of much acid, and little sugar, although agreeable in small quantities, do not contain sufficient nourishment to be depended upon, such as lemons. Another class of fruits, which contain, besides native vegetable acid, a visous mucilage, sugar, and a quantity of farinaeous matter, such as apples, pears, apricots, peaches, &c. should have their mucilage coagulated by heat, when given to patients in fever: baked, boiled, or roasted, they constitute a light and nutritious food. If animal food be employed at all during the progress of continued fever, (and the prejudice in favour of it in this country is so strong, that it is almost impossible to prevent the attendants on the sick from giving it, or to convince them that the patient can be sustained through the fever without it:) it should be used only in solution in water, and solutious only of the muscular parts of full grown animals. These afford a less viscid fluid than the flesh of young animals, or than the membraneous, tenacious, or faumentous parts: the fat or oily part should be removed by cooling and skimming it off, before the solution be given to the sick.

5. The nature of the drink which is proper to be given to persons laboring under fever requires some consideration. We have already observed, that, with respect to quantity, it is useless either to force the patient to drink more than his thirst requires, or to debar him from drinking as much as it urges him to take; and also, with respect to its temperature, that it may be taken cold, even in large quantities, under the same circumstances as the application of cold externally; namely, when the patient is in a febile heat, without any feve of chilliness, on the one hand, or prejudice against general perspiration on the other. In regard to the quality of his drink, the principle of avoiding irritation or excitement of the arterial action is to be constantly kept in view, at least in the early stages of fever. When there is considerable heat of the body, water from the spring is generally most grateful to the palate of the patient, and is not, perhaps, to be excelled in wholesome qualities by any combination of art. The light empyreumatic flavour given to it by toasted bread, or the imprigation of it with a small quantity of the essentia oil of the plants of the class *Dicyanum* of Linnaeus, such as sage, balm, &c. must be deemed altogether indifferent in their effects on the digestive, and may be employed or not, according to the ingestion of the palate of the patient. All fermented and spirituous liquors, as directly irritant to the fylfe, should be interdicted during the early and middle stages of continued fever, of whatsoever denomination. Dr. Fordyce, milled by a piece of hypothecus reflecting the procies of digestion, and misconstruing the meaning of the word *fermentation*, has recommended "weak vinous fluids" as drink in fevers. As these are "in a state of fermentation, he says, "and as substances in a state of fermentation are apt to excite any other fermentation that the same substances are capable of, are perhaps useful to excite in the stomach the fermentations by which the food is converted into chyle; they are, therefore, foul, perhaps, better than pure water." (Third Differt. part i. p. 216.) But this is an abuse of terms; for there is no analogy between the processes of visous fermentation in vegetables, and that of animal digestion; and the former author had already cautioned his readers against the use of the vegetable substances, as food, which were prone to fermentation, on account of the ill consequences which such fermentation produces. A more free use of vinous liquors is referred to, with great discretion to the patient, by some practitioners, who suppose that fever is a disease of mere debility, and therefore think of stimulating from the moment the idea of fever occurs: and the same pernicious practice is pursued by the people in general, at least the uninformed part of them, from the truly English prejudice, that if a person cannot eat, (i.e. cannot take solid food,) he cannot live; and that wine and spirits are therefore requisite to sustain him. These notions are so general among the uninformed, whether in or out of the profession, that it requires the constant vigilance of the practitioner to prevent the practical mischief resulting from them: we have hence thought it necessary to speak strongly upon this point; and regret that Dr. Fordyce, whose opinion is by some deemed little less than omnipotent on this subject, allowed himself to be misguided by an hypothesis, so as to give any countenance to the practice. While the indication of avoiding irritation is to be pursued, fermented liquors, even of the lowest quality, such as small beer, are scarcely admissible, unless the febile excitement be very moderate.

6. There are other irritating powers which are occasionally applied, and require to be removed in fevers; these are especially a collection of crude and undigested food in the stomach, and of feces in the intestines. If food had been taken a short time previous to the attack of fever, it must remain undigested, and therefore tend to aggravate several of the symptoms, especially the uneasines about the praecordia, the headache, the heat, and the velocity of the circulation and respiration. This, therefore, is another reason for the administration of an emetic, as well as for the use of diluting liquids. And the filmus of retained feces in the bowels equally suggests the propriety of laxative medicines or glyders, by which they may be removed; for, while present, they occasion a sense of fulness and weight in the abdomen, and of uneasines and restlessness in every part of the body, and augment the fever considerably. Of the effect of purgatives, as a general evacuant remedy, we shall have occasion to speak immediately. "The avoiding of irritation in all these particulars," Dr. Cullen observes, after a brief enumeration of the same circumstances, "constitutes the antiphlogistic regimen, absolutely necessary for moderating the violence of re-action; and, if I mistake not, it proper in almost every circumstance of continued fever." (Tifill Lines, § 132.)

To enable us to fulfill the first indication of "diminishing excit|ive action" in the fylfeum, several remedies are commonly used in aid of the antiphlogistic regimen; these are chiefly such as produce an evacuation of the circulating fluids directly, or of the secretions from them through their respective canals: for, as it is believed that the activity of the fylfeum depends, in a great measure, upon the summation of
of the fluids diffusing the vessels through which they circulate, it is inferred, that the diminution of the quantity of the fluids must diminish the activity of the fanguous system. The fact is proved by experience, whatever explanation may be adopted.

**Blood-letting**, by opening a vein in the arm, or any other part of the body, is the most direct means of diminishing the quantity of fluids in the system, and has been reported from very ancient times; its effects have been explained by various hypotheses, which it is not necessary to enumerate or discuss. To abstract that fluid, which is the immediate province of life, cannot, it is obvious, be a matter of indifference to the constitution; if it be the most powerful means of influencing the variations, so it is the most dangerous when improperly employed; if the most effectual mode of diminishing excitement, it is consequentially the most apt to induce extreme debility. A cautious consideration of many circumstances is, therefore, requisite in determining on the propriety of blood-letting in fever. Dr. Fordyce affirms, speaking of fever in the feafe in which we have defined it, (as distinct from the *phlegmasiae*, or local inflammations,) that, "the taking blood from a large vein, in any part of the body indiscriminately, never diminished, shortened, nor carried off a fever, in any case he has seen, nor has he found any upon record in which it had this effect." (Differt. Third, part ii. p. 4.) A statement which may, perhaps, render the extent of his reading very questionable; but which, as it relates to the fevers of this country, we are disposed to consider as correct. A pure inflammatory fever, or *fynocha*, is never seen, we believe, in this country; patients are seldom destroyed by a more general excitement, without topical congestion; but commonly by the subfequent exhaustion, together with local injury of some particular organ. In the fevers which we are acquainted with in this climate, then, blood-letting is generally to be avoided, on account of the danger of the subfequent debility which it occasions; more especially when we consider that this debility is to be expected, at all events, to ensue, in consequence of the failure of the digestive powers which support the health of the body; of the loss of pure necessary to reconstitute the vital energy; and of the concomitant over-action of the whole system, which is followed by proportionate exhaustion. In typhus, under all its modifications, these obervations demand attention; and it is now generally admitted that blood-letting is a pernicious practice in that form of fevers. It were not easy, indeed, to comprehend how the practice in low fevers could have been so generally and so long pursued, did we not know the influence of authority in perverting observation. While the precepts of Galen and Celsus were followed by Sydenham, Huxham, and others, these sagacious observers did not fail to remark the occasional injuries which the practice produced; (see Wilfon on Febrile Difeases, vol. i. p. 671, &c.) yet they did not escape from the trammels of authority, but repeated the practice, expressing "great concern and alackment" at the failure and mischief, which were often most evident. (See Huxham on Fevers.)

As the employment of blood-letting, in idiopathic fevers, requires much caution and discernment, the following circumstances were suggested for the consideration and guidance of the practitioner by Dr. Colles: 1. The nature of the prevailing symptom; from which we learn the nature of the symptoms which are to be expected, as well as the influence of different remedies. 2. The nature of the remote cause; all fevers arising from contagion, whatever be the state of the patient, or the appearances of the disease in the commencement, will soon assume the form of typhus, and therefore blood-letting is seldom admissible, although the excitement in the beginning be considerable. 3. The season and climate in which the fever occurs; for the symptoms are much more violent, and the changes more sudden in sultry than in temperate climates, in the autumn than in the spring. The practitioners in hot climates have been divided in their opinions respecting blood-letting; but in this, as in most other cases, the extremes are to be avoided; and it seems probable, that blood-letting is only to be employed in tropical climates, when the violence of the excitement threatens to prove speedily fatal, or to induce extreme debility, and then only to push it to that extent, which the urgency of the symptoms absolutely requires. (See *Fever, yellow*. 4. The degree of phlogistic diathesis, or of high excitement; which, however, it is difficult to define. The same degree of excitement, which warrants blood-letting in an epidemic, which partakes much of the *fynocha*, or inflammatory character, or in a fever from cold, violent excition, or rage, does not warrant it in a typhoid epidemic, nor in fever from contagion. 5. The period of the disease. In the most ardent fevers, as soon as the symptoms shew any tendency to decline, the proper period for blood-letting is past. Even Huxham, prejudiced as he and most of his contemporaries were in favour of this remedy, admits that "bleeding, unless in the beginning, seldom did service." 6. The age, vigour, and plethoric state of the patient. 7. The patient's former diseases, and habitudes of blood-letting; if he has been subject to inflammatory complaints, more vigorous remedies may be employed; and if he has been in the habit of losing blood, he bears the loss of it better, as habitual blood-letting produces habitual plethora. 8. The appearances of the blood drawn; which are chiefly the firmness or loose consistence of the coagulum, the presence or absence of the *buffy coat*, the proportion of leumen to the coagulum, &c. (See Blood, morbid alterations of the.) 9. And, lastly, the effects of the blood-letting that may have been already practised; namely, the continuance or alleviation of the symptoms, the occurrence of debility, &c. (See Colles, loc. cit. § 142, and Wilson on Fevers, vol. i. pp. 648, and 668, where this subject is fully and ably discussed.) On the whole, however, few cases of fever in this country require venesection, and in no case, perhaps, under any circumstances, is this remedy admissible after the first five days of the disease.

But the use of local blood-letting, by means of leeches, or cupping, is often of great advantage in certain conditions of fever, more especially in relieving local congections of blood in the head, and the symptoms thence resulting. Thus, when there is much head-ache, or delirium, accompanied by flushing of the countenance, and redness of the eyes, the application of a few leeches to the temples, or the scarificator and cupping-glasses to the same part, or to the nose of the neck, or even taking four or five ounces of blood from the jugular vein, has often diminished these symptoms considerably, sometimes carried them off entirely, and with them the whole fever. Under the same circumstances bleeding from a part distant from the head has been of no manner of use. If the strength of the patient be much diminished by the fever, or otherwise, the application of one leech to each temple is often of considerable benefit. (Fordyce.) We are disposed to believe, that the local evacuation of blood is a remedy too much neglected in the general practice in fever.

**Sweating** is another mode of diminishing excessive vascour action in fevers. The observation, however, that a free sweating commonly takes place in the crises of intermittent fevers, and in those which occasionally occur in continued fevers,
Fever.

F e v e r.

Fever, has led to much absurd and pernicious practice, for the purpose of forcing perpiration. Practitioners millook one of the symptoms of the cessation of fever for the cause of that cessation. But neither does sweating certainly carry off fever, (for it frequently takes place without even producing any alleviation,) nor is it alone a symptom of its cessation. Under such circumstances there is a general increase of all the secretions, the saliva, urine, &c.; and the tongue becomes moist, the skin soft, and so on. But when sweating is excited by the hot regimen, by stimulant alexipharmic medicines, a load of bed-clothes, and a heated atmosphere, these beneficial accompaniments do not take place; on the contrary, the heat of the body, the thirst, and general excitement are increased, as well as the head-ache, anxiety, and difficulty of breathing; and the very reverse of the indication of "removing irritation, and diminishing excessive action," is accomplished. This artificial excitement, supported by the hot regimen, perhaps, will enable us to account for the appearance of relief often produced by blood-letting, and for the perverence of our ancestors in the use of that remedy. More accurate observation, however, has decided, that in general, the most advantageous perpiration is produced by the opposite plan, viz. cooling the body, and diminishing excitement; in which case it is an indirect confluence of the treatment, and approaches more to the spontaneous sweating, which accompanies the natural sulation of fever. On the whole, therefore, the use of diaphoretic medicines is to be considered rather as auxiliary, than as an essential part of the treatment of fever.

The principal medicines now employed for the purpose of exciting perpiration are the neutral salts, especially those composed of an alkali with the vegetable acids, and the preparations of antimony. The neutral salts possess a very feeble power, which is supposed to be refrigerant; a term which is not very intelligible, and perhaps originated from the cold produced during their solution; the combination of potash or ammonia with vinegar, or lemon juice, are chiefly employed. But antimonials are more certain in their operation upon the skin. Of these the secret preparation of Dr. James, commonly called James's powder, the pubeis antimonialis of the London pharmacopoeia, which is probably the fame as the former, and the tartarized antimony, or emetic tartar, are principally used. They are all somewhat uncertain in their operation, and none of them possesses of any specific febrifugal quality; the two former, consisting of the simple oxyd, and therefore being liable to be combined with any acid in the first passages, and thus to be rendered more or less active, according to the quantity of acid which may be accidentally found there, are more uncertain in their action, than the emetic tartar, in which the antimony is already saturated with an acid. The moderate use of dilute drinks tends to aid the operation of diaphoretic medicines, partly by the sympathy of the skin with the stomach, and partly, perhaps, by supplying an increase of the thinner parts of the blood. The use of diluents was carried to a great extent by the Spanish and Italian physicians, in what they called the dista aqua, which consisted of abstraining every other kind of aliment and drink, and giving, in divided portions every day, for several days together, six or eight pints of plain water, generally cold, but sometimes warm. (See Philosoph. Transact. vol. xxix.) But this drudgery has not been frequently countenanced either by reason or experience. The use of dilute drinks has been supposed to be advantageous by diminishing the acrimony of the blood, and consequently its stimulating quality, in fevers; but the existence of this state of acrimony has never been proved, and we are not acquainted with any evidence that renders its existence probable.

Purging, so far as to empty the bowels of undigested aliment, or feculent matters remaining in consequence of the weakened peristaltic motion, we have already said, is useful, by removing a troublesome source of irritation. Dr. Cullen, Dr. Fordyce, and others have considered this as the only advantage derived from emptying the intestines, and believed that it merely obviated the mischief, which would ensue from the retention of those matters. Dr. Fordyce, indeed, affirms that all evacuation beyond this is detrimental, as producing debility, and that simple evacuation from any of the glands, as tending also to weaken, is detrimental instead of being useful. Many other physicians have expressed similar opinions, and rather diffused us from the use of purgatives, among whom are De Haen, Werlhoff, &c. Dr. Cullen, considers it "sufficient to prevent colic virescens by almost daily clysters, if the patient had not otherwise regular rooks." (Pringle, Difefases of the Army. p. iii. cap. i. See also Cullen, loc. cit. § 149, &c.) Dr. Cullen considers purging as injurious, both from producing debility, and from taking off the determination to the skin, and thus preventing perpiration; but this, in the active state of fever, is not, we believe, the result of its operation; since, as we have shown, with regard to the diminution of the febrile heat by cold water, whatever tends to alay the excessive action of the cutaneous vssels, tends to produce a flow of perpiration. The necessity of preventing any accumulation in the bowels, however, whether by repeated clysters, or gentle laxatives by the mouth, is universally admitted.

But since the prejudices of lytten and of particular schools have been somewhat laid aside, it has been observed by several intelligent practitioners, that a more active employment of purgative medicines is frequently beneficial in fever; and that not only in inflammatory fever, but in typhus. Dr. Hamilton has recently called the attention of the medical world to this important subject; and he affirms that he has for many years given up the use of emetics and clysters in typhus; and that he finds all the advantages of these medicines obtained in a more effectual manner by cathartics given internally. (See his Observations on the Utility of Purgative Medicines.) With this view he chiefly employs a combination of the sub-muriate of mercury, or calomel, with a few grains of jalap or rhubarb. He considers, that if fever does not originate in many instances from an accumulation and corruption of the contents of the alimentary canal, it is generally connected with, or productive of, such a state; and he affirms, that the removal of the dark and offensive matter which purging, under such circumstances, generally effects, is a most important step in the cure of fevers. The presence of these matters in the canal is a source of augmentation to the general fever; and we have in several cases been delirium removed, the head-ache diminished, and the state of the skin, tongue, and circulation, proportionally alleviated by the operation of a moderate cathartic; in some instances, in which the fever had been preceded by considerable contipation, a brisk cathartic or two have appeared to remove the symptoms altogether. In the early stage of fever, then, cathartics are advisable, both as removing a great source of irritation, and as exciting the glands which open into the bowels, and the mucous follicles and chalazent arteries in their course, to pour out an increased quantity of fluids, by which the general excitement is diminished; although in a considerably lefs degree than by blood-letting. (See Cathartic) The first operation, of removing irritating fords, is afterwards...
wards necessary during the whole progress of the fever; and in
the weak-est condition the use of a calomel may be re-
ferred to. The second operation, with a view of emulsifying
the bilious ducts, and of evacuating the morbid secretion
of the liver, and of the other glands, and clearing the
whole canal, is often required during the continuance of the
disease. This is indicated, 1. By the appearance of the
floods, whether they are of a highly bilious colour, which
implies a copious excretion of bile from the liver; or of
a dark brown or green hue, and very offensive odour, which
implies a morbid state of the secretion; 2. By pains in the
abdomen, especially when there is at the same time a degree
of fullness and tension in the epigastric and hypochondriac
regions, and a tenderness perceived on pressing the abdo-
men; or when there is also a degree of hepatica, or frequent
dehis to go to stool. 3. When, together with these symptoms,
the tongue is much loaded and parched, or sometimes when
there is a considerable spitting, when the countenance is of
a dirty or leaden hue, and the breathing much oppressed
than the state of the circulation would lead us to expect.
Sometimes with this state of the abdomen and countenance
a great Laurent takes place, even to fainting, al-
though there are no other symptoms of extreme prostration
of strength, and the pulse, though quick, is not equally
languid; under such circumstances we have seen the la-
enguor speedily removed by a copious evacuation from the
bowels. A degree of dysenteric affection is not un-
frequently seen in the advanced periods of fever; that is, a
frequent discharge of loose or slimy fluids, with some griping
and tenesmus; this is most effectually relieved by purga-
tives with which opiates are combined, in order to obviate
the irritation and exhaustion which the operation of the
cathartics might induce. Calomel and opium combined in small
doses seem to answer this purpose very effectually. Where
the mere emptying of the bowels is the object of the medi-
cine, and especially where extreme weakness has already
come on, or is to be speedily removed, the milder neutral
fats, as the sulphate of magnesia, the Cheltenham, or Ro-
chelle salts, castor oil, maguey and rhubarb, &c. are the
most proper remedies; but the more active agents, as calomel,
and jalap, in moderate doses, (Dr. Hamilton's formula
confists of three or four grains of the former, with six,
eight, or ten of the latter,) are requisite; and these, in-
deed, may almost supersede all other laxatives; or senna,
Jlbharb, &c. may be given with the calomel. It is not
very important to dilate on the different remedies; for when
the indication is understood, the means of fulfilling it will
readily appear. An active purgative, during a state of ex-
ternal cold, may be productive of great mischief; and in
the last stages of contagious typhus such a medicine is to be
obtained from altogether: even the mildest cathartic op-
eration has, at such times, occasionally produced a dan-
gerous linking of the vital powers. But from this fact it were
an error to infer, that active purgatives are to be discarded al-
together from our practice in typhus, as the Brunonians
have affected.

The humoral pathologists, from a hypothetical notion
of the remains of the mediates mortis being retained in the
constitution after the ceasation of fever, have directed the
administration of cathartics to carry them off, and to pre-
serve the convalescent from their future influence; and Dr
John Pringle has suggested the propriety of using them,
during the state of convalescence, with a view to prevent
a too haftiy repeation, which an indulgence of the appetite
is sometimes apt to produce; but, he observes, cathartics
at that time seem otherwise necessary. But Dr. Forley
remarks, that he has observed more relapses to take place
when purgatives have been used after the cessation of fever,
than when they have not been employed. Indeed, the no-
tion of the humors, that by partial evacuations, whether
by bleeding or purging, the remaining fluids could be de-
prived of the noxious matter, supposed to be diffused in
them, is too absurd to require a serious refutation. Never-
theless, this practice of purging, "to carry off the dregs"
of fever, small pox, &c. is still generally prevalent among
the ignorant, both in and out of the profession.

Fever.

When the skin has been refers to as a remedy in
fever, upon two very different principles, which are scarcely
confident with each other, and neither of them, perhaps, is
much entitled to our confidence. Inflammation, and fu-
puration, or some other discharge, having been observed to
precede the cessation of fever in certain cases, the proc-
eds was attempted to be imitated by the application of blisters
or irritants, composed of caustic, Dr. L. of the Haflar hospita,
whole experience and abilities are entitled to the highest regard.
"I do not know a more certain proof," says this respectable author, "of a prevailing
infectious fever, than that of twenty patients in fevers
blistered at night, sixteen will next morning be entirely free
from heat, head-ache, pain, and fever." (Loc. cit. chap. ii.
sect. 1.) And he denies the dissolving effect of blisters in
contagious fevers, and affirms that, "acc ording to the
nurses' phrase, the patient generally received a cool from the
blister," (ibid.) These encomiums, however, are very far
from being corroborated by general experience, or by the
authority of many able physicians; and on the contrary,
the testimony of the majority tends to prove, that little is to be
expected from blisters in fevers unaccompanied by local
affections. We have seen numerous instances in which
large blisters had been applied between the shoulders in
the early periods of fever: but we never witnessed any
marked effect, either good or bad, in those cases. Like
the local blood-letting, however, they are decidedly benefit-
ful in relieving local pains and contusions; and every
practitioner has experienced their utility, when the brain,
locomot, lungs, &c. have been thus affected. Sir John
Pringle observes, that blisters were only of service in the
good fever, when the patient was threatened with an inflam-
ation of the brain. "Blisters, before used, became then of
service;" and in the synocha, or inflammatory fever, he
was led by experience to confine their use to those cases
where the head-ache was considerable, which they seldom
failed to relieve. In fevers attended with coma or delirium
they are often employed with advantage. They are applied
over the blenned scalp; for the nearer they are applied to the part
affected, they are the more powerful in giving relief, like all
other local remedies.

Dr. Cullen was likewise a strong advocate for the use of
blisters in fevers; but he considered them as most benecial
in the advanced periods of the disease, "when the re-action
being weaker, all ambiguity from the stimulant power of
blistering is removed." We are disposed to believe, how-
over,
ever, that the stimulus of a blister is productive rather of irritation, than of support to the linking system; and the inflammation thus occasioned, when the vital powers are low, is liable to terminate in gangrene. Rubefacients are safer than blisters in this state of the system, but do not seem to be of much benefit where there is no local affection. Sinapisms, or mustard poultices, are sometimes applied to the feet, especially where there is coma, or great failure of the *viv aet: this, like the old practice of bleeding from the feet, probably originated in the obsolete doctrine of revulsion, and would be more efficacious, if the sinapisms were applied to the region of the stomach, or to the head.

The second indication is, "to increase the actions that are defective." It has been seen, in tracing the history of the progress of fever, that the symptoms, which occur in the former stages of the disease, are principally the result of a general failure of the vital power, or nervous energy; and that such a failure is the necessary result of the previous over-excitation, and the privation of the ordinary means of support, from aliment, sleep, &c. Hence, then, the means of preventing this failure of life consist partly in fulfilling the first indication, or diminishing the over-excitation, and partly in using those remedies which tend to support and increase the vital actions, when the symptoms of their failure appear. It must also be obvious, therefore, that the early employment of stimulants, cordials, and tonics, which was referred to by the humoral pathologists, in order to accelerate the conclusion of the morbid matter; by the disciples of Brown, with a view to obviate debility, and by others to prevent putrefaction, must be extremely pernicious. It is a practice founded on the same grounds as the vulgar error of the people in forcing food upon a person in fever. They forget that, in order to nourish the body, the food must be digested, converted into chyle, and assimilated; but that, while the system is incapable of performing these functions, the food introduced tends but to increase the weakness, by increasing its cause, the febrile state. In like manner, the practitioners no sooner hear the name of fever, than they immediately ply the patient with wine, Peruvian bark, and various cordials, regardless of the period and circumstances of the disease, and thus accelerate the debility, the consequences of which they are most anxious to avoid. This treatment cannot be too strongly reprobated; especially as it is still adopted by many in the profession, who practise by rote, notwithstanding the proofs of its uneffectiveness, which experience has so plainly averted. And it is most particularly to be condemned, when there are symptoms of considerable local congestion, especially in the head.

When, however, the means of moderating the excitement, in the former stages of the fever, have been omitted, or have failed to terminate the disease, and the symptoms of exhaustion and defective action begin to appear, it then becomes requisite to administer those remedies which poffefs a stimulant power over the actions of the arterial and nervous systems. Of the medicines which support and increase the actions of the animal body, those which are poifoffed of strong favourable qualities, and excite an obvious and immediate action, are denominated stimulants; and those which flow, and by repeated exhibition, increase the power and force of these actions, or the tone of the moving parts, have been called tonics. Of the former class are wine, spirits, volatile alkali, the ethers, &c.; of the latter are the bark of cinchona, cæfarilla, and other vegetable bitters, the metallic salts, and oxys of iron and zinc, &c. Now, as the operation of the latter is comparatively slow, they are less useful in the late stages of continued fever than the articles of the former class. The principal tonic medicine that has been employed in continued fever is the cinchona, or Peruvian bark; which has probably been given in these fevers, in consequence of its success when administered in the intervals between the paroxysms of intermittent fever. Between this operation, however, and the cure of a continued febrile state, it is obvious that there is not much analogy; and experience has evinced accordingly, that the practice is not beneficial; but that, on the contrary, it more frequently increases the symptoms of continued fever, and that its use is most likely to be detrimental, especially when the tongue remains foul, the pulse frequent, and the skin not yet become lees, cool, and moist. Dr. Fordyce has accurately described the consequences which we have occasionally witnessed from the exhibition of the bark, even when the favourable remission of the symptoms seemed to justify its use. "The relaxations which began to take place in the disease have been much diminished, the pulse has become more frequent in the morning, the headache more considerable, the skin drier, the tongue covered with a thicker fur, the colic vesicles greater, if the patient was not thrown into a purging, the oppression upon the precordial greater, and likewise the difficulty of respiration greater. On the following evening the head has been also much more affected, that is, the conjunctiva and delirium have been much more considerable, and the patient altogether worse than he probably would have been, if no remedy whatever had been exhibited, and there has been less chance of cure in the fever, and it has been longer of being worn out." (Third Differt. part ii. p. 148.) Where there are marks of congestion in the head, lungs, or other viscera, the administration of bark is at all times to be deprecated. In a word, the most accurate experience has taught us, that the cinchona, especially in subhance, is seldom beneficial, and often injurious, in continued fever of any kind; and that it is most useful in reining the strength in the convalescent state, when the symptoms of fever have altogether disappeared. The only cases in which we have seen any advantage from it, are those in which there is an obvious remission and exacerbation, especially at tertian periods; a form which we have sometimes observed the continued fever of this country to assume. A great variety of stimulant remedies have been employed for the purpose of obtaining debility in the late periods of continued fever; of these cinchona is generally the most grateful, and not less efficacious than most of those which have been recommended. But this, we believe with Dr. Gregory, has been often given in too large quantities, to the amount of two or three bottles in the day. We have certainly seen the strength robed by powerful stimulants in great quantity; but we have also seen this new excitement immediately followed by a fatal inflammatory condition of the brain. Perhaps a pint in the day may be generally sufficient. When wine cannot be procured, either, porter, or spirits diluted with water, sweetened and acidulated, are valuable substitutes. Dr. Cullen was of opinion that the most mentioned compound and opium produced all the effects of wine; but opinion does not appear to support the popular like wine. With respect to opium, it is generally safe while any considerable excitement exists, and especially when the skin is hot and dry, the tongue very foul, the bowels bound, and marks of congestion in the head, or elsewhere, appear; under these circumstances it neither diminishes relapses, nor tends to induce sleep; but, on the contrary, it creates the watchfulness, and disturbs the mind with excessive and frightful dreaming, increaseth the delirium, and the torpid
heat and thirst. When the skin is moist and cool, and the head but slightly affected; when the tremors,subfits, and the whole person are affected; when the bowels are excessively relaxed, and the evacuations watery; opium may be usefully employed. Under the same circumstances camphor is frequently administered as a stimulant: but it may be judiciously, as Dr. Fordyce has observed, whether the very small dose contained in what is called the camphor mixture, usually given, produces any decided effect: since much larger quantities have been given without any sensible influence. Musks, caftors, and other substances of powerful odor, have been often given in the last stage of fever; but the effects have been differently represented by different practitioners, some believing them to be very effectual stimulants, while others have deemed them almost inert. Dr. Gregory considers them as no farther active, than by their strong impression on the senses, and much, less efficacious antipathetics than wine and opium. The ferpertinaria, or snake-root, antiperite, and other cordials and aromatic vegetable substances are often administered with advantage. It must be remembered, however, that there are marks of considerable congestion of the brain, all powerful stimulants, which will tend to augment that condition, will ultimately fail to produce strength; but, on the contrary, will increase the most dangerous symptoms of the disease.

Much has been said relative to the prevention of putrefactive in the last stages of infectious fevers. This, however, as chiefly the result of extreme prostration of strength, is principally obviated by the means of support already pointed out. These marks of putrefactive changes exist principally in the excretions of the patient; which is important to remove, as their presence seems to augment the depuration of the vital powers: hence the utmost attention to cleanliness is requisite, and clean air, if we may so speak, or air free from the noxious exhalations, admitted by a constant ventilation, contributes to support the patient. The putrid fœces contained in the bowels or bowels are often evacuated with great advantage, and may be effected by gentle means, which do not contribute to further exhaustion. With view to correct the putrefactive of these contents of the alimentary canal, various antifeptics have been recommended, especially the mineral acids. That these acids, especially the vivric acid or phosphoric acid, which has been principally employed, are sometimes useful, cannot perhaps be questioned; but it is probable that their administration was suggested upon the principle of being chemically antifeptics to dead animal matter. A chemical explanation of the operation of a medicine on the living body is somewhat ambiguous; and Dr. Fordyce has remarked, that no antifepic can be applied in that proportion to the living solid, as would be requisite to prevent putrefaction in dead animal matter. (Loc. cit. part ii. page 171.) These acids, however, tend to quench thirst, and to settle the bowels, and are grateful to the patient.

Dr. Gregory is in the habit of concluding his lectures on the subject of fever by strongly cautioning his pupils not to do too much to patients labouring under the disease; for he justly averred, that in many cases, little more would be requisite, after the proper evacuations at the commencement, than cool drinks, and the antiphlogistic regimen already pointed out. And this is unquestionably true of fevers not occasioned by a virulent contagion, and where no considerable local congestion occurs; in which case it becomes us to watch rather than to be active. This, however, will seldom satisfy a patient, or his friends; and hence the building mischievous empiric is often preferred to the experience of the physician, as Sydenham, who attributes fame of the worst symptoms occasionally to the "nimia medicorum diligentia," feelingly laments. "Sed, quod dolendum omnino est, zegorum quam parimenti, habu suis quoque, quandoque is nihil agere, atque atque tempore efficacissima adhibere remedia, probatis atque fideli fructum hunc capere nolunt, sed vel negligentia vel ignorantia id imputant, cum empiricorum inulisllimums quibusc medicamenti medicamentis adiicere ac voluit, ac folis magis quam medicorum prudentissimus." (Sydenham, Opera, fec. i. cap. 6.)

Division of Fevers. — Having discussed the nature, causes, and cure of fever in general, it remains for us to notice the various forms of the disease, which have been distinguished by particular appellations. From the earliest periods of medical history, a great number of names have been applied to the varieties of febrile disease, which, as they were often deduced from hypothetical notions, respecting the nature and cause of the fever, often more indications of the violence or absence of particular symptoms, and often very vague in their signification, have tended to introduce much confusion into the writings of physicians on this subject. The majority of the names, which have been thus invented, are applicable to the same fever; at least to a fever arising from one and the same source; whence, it has been justly remarked by Dr. Lind, that physicians, who have had the most frequent opportunities of seeing numerous patients in fevers, have always found great difficulty in arranging their cases under the common appellations, and that the attempt has frequently led them into absurdities. (On Fevers and Infections, chap. ii. fec. 2.) For the same fever the term putrid, petechial, malignant, inflamed, nervous, bilious, typhous, verminous, &c. are often equally applicable. It is obvious, however, that accidental symptoms of local affection, or the accidental violence or mildness of any particular symptom, do not mark a fundamental change in the nature of the disease, and are therefore not the proper grounds for multiplying names, which tend to confound disorders that are essentially the same, and therefore to mislead us in our practice.

The least ambiguous division, which is now generally adopted, is into three orders, of intermitting, remitting, and continued fevers; which are again distinguished by their leading symptoms. The intermitting fevers are those which occur in distinct paroxysms, or fits, in the intervals between which there is a complete apoplexy, or absence of all febrile symptoms; this is termed an intermission. In the remitting fevers, which also consist of repeated paroxysms, there is no entire intermission between the paroxysms, but only a considerable abatement or remission of their violence; the return of a new paroxysm, however, being generally marked by chilliness, and some other symptoms of a cold stage. By continued fever is understood a fever which goes on day after day, without any intermission or decided remission of the symptoms; not in an uniform progress, however, but with an obvious aggravation or exacerbation of the symptoms of a hot stage, once in the twenty-four hours, and generally in the evening. Many of the ancient and modern writers, indeed, down to the time of De Lancy and Cullen, have described a continued fever, proceeding in one uniform and unvarying tenor, without exacerbation or abatement of any symptom, in a word, confining of one lengthened paroxysm: this they denominated a continued fever, in contradistinction from the intermitting fever, just described. By the Latin writers the former is called febris continuas; the latter febris continua; by the Greeks the former was denominated τερτας συνέχεις, συνεχόμενος; the latter τερτας συνέχεις, συνεχόμενος.
FEVER.

By some writers, again, the 
continent fever is called continued, and what we now understand by continued fever is called continued-remittent. 
Our countryman, Morton, whether through mistake or 
design is not evident, has revered the common acceptance 
of the terms, (as has been justly remarked by Burfeius, 
Infl. vol. i. § 194. and by Selle, in his Rudim. Pyroto-
logy,) and describes the continent fevers, or 
suppes, as remittent. 
(See Morton, Pyroto logia.) De Haen, how-
ever, and Cullen, denied altogether the existence of a 
continent fever, without periodical exacerbation, as it never 
occurred to them in the course of a long experience; and 
their opinion is now generally admitted as correct. Burfe-
lius and Selle maintain the ancient doctrine. 

The confusion which has enveloped this subject does 
not, however, end here. For Dr. Cullen, Burfeius, and 
others, who have still farther reduced the orders of fevers 
to two only, viz. intermittent, and continued, (deeming the 
remittent fevers different only in degree,) have never-
theless widely disagreed in their arrangement of the latter. 
Cullen has chaffed the remittents with the intermittent fevers, 
considering the remission as a lesser intermission; 
while Burfeius has placed them with the continued fevers, 
considering it as a greater exacerbation and abatement: so 
that we find the same identical diseases among the continued 
fevers in the writings of Burfeius, which are placed among 
the intermitten ts of Dr. Cullen. The arrangement of Dr. 
Cullen, however, would seem to be the most correct; first, 
because the intermission and remission more nearly accord in 
their phenomena; and, secondly, because both these fevers 
are in general from the influence of marsh effluvia. 

We shall here proceed to enumerate the principal 
appellations of fever which are to be found in the writings 
of phyficians; referring for the full explanation of the majority 
of them to their places in the alphabet, as more conftant 
with the nature of a dictionary. See also FEVERIS; where 
the Latin and Greek names, for which we have no corre-
sponding English terms, are enumerated. 

Fever, Acute, a term of indefinite application; some-
times used to denote idiopathic fever, and sometimes indi-
cating a fever with violent symptoms, whether idiopathic, 
or symptomatic of local inflammation. 

Fever, Ardent, Febris ardens of the Latins, the fame 
with the caninus, κανίνος, of the Greeks, signifying those 
forms of fever in which the heat in the early stage is exce-
five. The words are from ardor, and κάνος, I burn. 
The terms have been variously applied to intermittent, remittent, 
and continued fevers, in which this symptom prevailed. 
The yellow fever of hot climates is the most ardent fever 
with which we are acquainted. (See FEVER.) The 
word ardent is nearly synonymous with inflammatory. See 
Sennertus de Febribus, lib. ii. cap. 12. 

Fever, Bilious, a term applied to the habitual fevers, 
whether idiopathic, as the remitting or continued, and those 
continued fevers in which there is a considerable discharge 
of bile, or to cholera, and dysentery. (See Pringle on 
Diseases of the Army, part ii. chap. 1. and part iii. 
chap. 4.) Hippocrates considered all habitual epidemics 
as originating from a corruption of the bile, and the term 
has been often used, perhaps, upon his authority, without 
any evidence of a morbid flat of this fluid. In hot 
climates and seafons, however, there is generally a tendency 
to superabundance of the bilious secretion: and the yellow 
fever, which is so named on account of the bilious tinge of 
the surface, may be considered as an example of Bilious 
fever in its most violent form. 

Fever, Catarrhal. See CATARRH.
clumsy, gen. 4) Under this definition it corresponds with the 
*yrica non patriis, and continua a patriida, of several authors, and 
the (aburdly named) *phima^ pluman die-
rum, or daily fever of feral days, of others. (See Sen-
nert, Dr. Febril. 1 b. c. 6. Boeckhues, 728.) Such 
divisions, however, cannot be regarded as accurate, or as 
differentiating forms of fever essentially different in their na-
ture; for, in fact, the puré *ynocha, or fever with no other 
but inflammatory symptoms, is scarcely ever met with, as 
we have already remarked; nor is a purely opposite, or 
typus fever, which is characterized only by symptoms of 
proliferation of strength: almost every continued fever being 
inflammatory, or marked by some degree of excitement in 
the beginning, and nervous or typhoid, i.e. marked by de-
bility in the latter stages. This constitutes an intermediate 
genus, which Dr. Cullen has called *ynocha. Thus the 
•ynocha, or fabric oradus, and the yellow fever 
of modern times, is characterized by the highest excitement in 
itself total, but is perfectly typhoidal in the left.

The symptoms of the *ynocha, or inflammatory fever, as 
it is commonly described, are as follows. The depression 
of strength, which precedes and accompanies the attack, is not 
so great as in contagious fever, and the cold stage is more 
frequently absent, and lasts marked. The pulse, even in the 
cold stage, is seldom small or very frequent; after the heat 
commences it becomes full, rapid, and, as it has been 
termed, florid; still, however, its frequency is less than 
in those fevers in which debility prevails. The respiration is 
frequent, hurried, generally suppressed, and attended with 
a dry cough. The heat is greater than in other continued 
fears, and although burning to the feeling of a flatter, it does not excite that pungent or acrid sensation 
which is observed in the feverous cases of typhus. Dr. Moore 
remarks, speaking of the latter, **on pressing the skin of 
the patient a sensation of a peculiar penetrating heat 
remains on the hand for some minutes after; whereas, the heat 
communicated by the skin of a patient in the inflammatory 
fever is more transient. (See his Medical Sketches.) Dr. 
Huxham, as well as Pringle, and others, has remarked 
the peculiar biting heat in malignant fevers, and observes 
that Quetelet calls it la chaleur d’un enceinte,** and very judiciously 
distinguishes it from la chaleur d’inflammation. The fea-
tion in truth is as different as touching a very hot piece of 
dry wood, and dipping your finger into tepid spirit of hart-
florn. The head-ache in inflammatory fever is generally 
considerable, accompanied with throbbing of the temples, 
and seems, in the earlier stages, to be calm and florid, and the 
eyes inflamed, and incapable of bearing the light. The de-
pravation of the senses, however, is less frequent than in 
fears with debility, nor is delirium a common symptom; 
but when it does occur in *ynocha, it rises to a degree 
which, from the debilitated state of the system, we fear-
fully ever met with in typhus: the patient becomes frantic, 
and is with difficulty retained in bed. This constitutes the 
delirium of authors. (See Delirium.) When the de-
lirium is obilimate in *ynocha, we have reason to suspect an 
inflammatory affection of the brain, which there is still more 
reason to dread, if the patient be oppressed with coma. In 
truth, between this form of disease, and inflammation of the 
brain, the diagnosis is difficult, if there be any effential 
difference. The febrile powers are more completely 
fused than in most cases of typhus: the skin, mouth, 
and throat are dry, and the mucus covering the tongue be-
comes foul and vitious; the urine is high-coloured, and the 
bowels colicky. In a word, it is obvious that the inflam-
motorsympotms of the hot stage of fever.

When *ynocha proves fatal within a few days of its com-
encement, (which, if it ever happens, is a rare occurrence) 
the pulse is fast, does not become weak or intermittent 
before death; the patient seems to be carried off by the 
viola-
ence of the excitement. When the disease continues for a 
long time, however, and the symptoms are at all evident, 
the pulse during these (although the fever has not yet affum-
ced the form of typhus) becomes weak and languid, the 
patient appearing to be exhausted by the foregoing paroxysm; 
which is renewed, however, in a short time, with all its 
former violence, or even stronger marks of excitement. The 
hemorrhages, which frequently occur in inflammatory 
fear, are generally from the nose, ears, lungs, rectum, (if 
the patient be subject to the hemorrhoids,) or from the u-
terus, and are almost always favourable: the blood discharged 
has the healthy appearance, except that the coagulum is 
frequently covered with the bloody coat. Hemorrhages 
from the upper parts of the intestines, kidneys, urethra, 
skin, eyes, &c. are rarely, from the two last perhaps never, 
observed in inflammatory fever.

Such are the symptoms of well-marked *ynocha; they 
varied in different cases from those just enumerated, to the mild 
fебile symptoms attending a common catarrh or ephemer. 
After they have continued for some time, if they do not ter-
minate the patient’s life, they always, at last in this 
country, begin to be changed to those of typhus; so that the 
whole disease is *ynocha. The proportion of the respective 
forms of the disease is different in different cases; and proves 
an endless source of variety: but the symptoms which follow the 
state of increased excitement are the most dangerous as well as 
the most varied part of the fever.

The principal indication in the cure of inflammatory fever, it 
must be evident, is that which we have stated above as 
the chief indication, in the general care of fever, (see FEVER; 
Method of Cure, vide, "to diminish excitative action." The 
means of fulfilling this indication, by the antiphlogistic re-
gimen, and evacuant medicines, in other words, by remov-
ning or diminishing all sources of irritation, and by diminu-
ishing the quantity of the circulatory fluids, have been detailed 
at length, and need not here be repeated. The higher the 
degree of inflammatory diathesis, the more requisite will it be 
to employ active evacuation, at an early period of the 
fear, and there will be the less hazard of carrying it to an 
jurious degree. In this country, however, as we have 
already stated, such a degree of *ynocha is seldom seen, as 
requires, or is better fitted to general excitement or 
heart, or yellow fever of tropical climates, the inflammatory 
extinction is more rapid and more severe, and the activity of the 
antiphlogistic practice must be necessarily greater. (See Willon on Febrile Diseases.) See FEVER, yellow.

FEVER, Intercurrent, a denomination given by Syden-
ham and others to those forms of fever which constantly 
occur sporadically, that is, independent of the particular 
epidemic season, or of the reigning contagion.

FEVER, Intermittent, a fever which occurs in distinct fits 
or paroxysms, with an interval of health, or complete ab-
ence of fever, between them: from the shivering which 
commences the fit, the disease has been called *yncha, 
which see; and according as the fit recurs, every day, every 
alternate day, or once in three days, it has been termed a pro-
tidalum, a tertian, or a quartan ague. See these words 
below.

FEVER, Intermittent, a term applied to some writers to 
those varieties of continued fever in which there is much 
diarrhoea, with feverish oedema, &c. pain of the belly, in-
flammation, or other symptoms of abdominal disorder. Other au-
thors
thors have used the epithets gaeric and nefenteric with the
same intention: and the fomes infechlorides and excremen-
tuses of others are the fame. This multiplication of names
is altogether useles, since they do not imply any difference
in the effeclual nature of the fevers, and it gives rise to
great confusion in medical language.
• Fever, Lenticular, the famine with petechial. See be-

Fever, Malignant, a vague and improper term generally
applied to fevers of a contagious origin, with symptoms of
extreme prostration of strength, petechiae, hemorrhages,
fected discharges, &c.; in a word to typhus, in its word
forms; and also to scarlet fever in its most severe modificaf-
tions, the plague, and other dangerous embemics.

Fever, Military, a modification of common fever, ac-
companied with an erection of spots not larger than millet
feas. See Military erupafion.

Fever, Milk, a fever afflicting puerperal women, and
accompanied with dilation of the mammae. See Milk-
Fever.

Fever, Morbillous, Fivered modilliform, a term given by
Sydenham, perhaps with the fame impropriety as in the
case of dysenteric fever, (see above,) to a fever occurring
during the prevalence of epidemic measles, but without the erup-
tion, or with very little of it. See Mefures.

Fever, Nervous, a name given by some writers to all
the varieties of fever, accompanied with debility, in contra-
distinction to those which are chararacterized by aeral
strength, which they call inflammatory. But Dr. Huxham,
and after him many other physicians, have appropriated the
term nervus to a particular form of fever with debility,
which goes through a long and flow course, unattended by
the exclusive excitement of inflammatory fever, on the one
hand, or by the extreme prostration of typhus on the other.
At the same time, as it is accompanied by great loss
of muscular powers and mental inactivity, without the marks
of infecion in the fluids discharged, it was supposed to
be a disease of the "animal spirits," or nervous fluid, and
not of the blood; whence the term nervous was adopted.
Dr. Huxbam’s description is considered as a very matterly
example of medical history, and we shall give the outline
nearly in his own words.

The patient at first grows somewhat bileaf, and feels slight
chills and shudders, with uncertain sudden flushes of heat,
and a kind of weariness all over, like what is felt after great
fatigue. This is always attended with a sort of heaviness
and depression of spirit, and more or less of a load, pain, or
giddiness of the head; a numb- an and difficult of every thing
soon follows, without any considerable thirst, but frequently
with urging to vomit, though a little but injurious phlegm
is brought up. Though a kind of hiced interval of several
hours sometimes intervenes, yet the symptoms return with
aggravation, especially towards night. The head grows
more heavy or giddy, the heats greater, the pulse quicker
but weak, with an oppressive kind of breathing. A great
torpor, or obtuse pain and coldness, affects the hinder part
of the head frequently, and oftentimes a heavy pain is felt
on the top, along the coronary future; this, and that of the
back part of the head, generally attend nervous fevers, and
are commonly succeeded by some degree of delirium.

In this condition the patient often continues for five or six
days, with a heavy, pale, funk countenance, seemmg not
very sick, and yet far from being well; restless, anxious,
and commonly quite void of sleep, though sometimes very
drowsy and heavy; but although he appears to those about
him actually to sleep, he is utterly inapparent of it, and de-
neys that he doth fo. The pulse, during all this time, is
quick, weak, and unequal, sometimes fluttering, and some-
times for a few minutes slow, nay, intermittmg; and then,
with a sudden flush in the face, immediately very quick,
and perhaps from after surprizingly calm and equal; and
thus alternated. The heats and chills are as uncertain and
unequal, sometimes a sudden colour and glow appear in the
checks, while the tip of the nose, and ears is cold, and
the forehead at the same time in a cold dewy sweet. Nay, it is
very common, that a high colour and heat appear in the
face, when the extremities are quite cold. The urine is
commonly pale, and often limp, frequently of a whey
colour, or like vivid small beer, in which there is either no
manner of sediment, or a kind of sooty matter, like bran,
irregularly flattered up and down in it. The tongue at the
beginning is feldom or never dry or discoloured, but some-
times covered with a thin whitish mucous: at length indeed
it often appears dry, red, and chapped, or of the colour of
pomegranate rind; but this mostly at the close of the
feared; yet, however dry the tongue and lips seem, the
patient scarcely ever complains of thirst, though oftentimes
of a heat in the tongue.

About the seventh or eighth day, the giddiness, pain, or
headaches of the head become much greater, with a coniunct
noize in it, or ti'neflus aurium, which is very disturbing to
the fick, and frequently brings on a delirium. The loon
the precordia, anxiety, and faintness grow much more
urgent, and the patient often falls into a violent delirium
or fainting; especially if he attempts to fit up; cold
fevets suddenly come on the forehead, and on the backs
of the hands, (though at the same time there is too much
heat in the cheeks and the palms) and as suddenly go off.
If the urine now grows more pale and limpid, a delirium
is certainly to be expected, with universal tremors and fufi-
tus tendinm. The delirium is seldom violent, but as it
were a confusion of thought and action, the fick muttering
continually to themselves, and fumbling in their speech;
sometimes they awake only in a hurry and confusion, and
preently recollact them felves, but forthwith fall into a
muttering dozy state again.

The tongue grows often very dry at the height of the
fever, especially in its middle part, with a yellowish hat on
each side, and it trembles gently when the fick attempt to
put it out. When the tongue at this time grows more
mud, and a copious fitting comes on, it is always a very
good sign; but where a difficulty of swallowing, continual
gulpmg, or choking in the throat supervenes, it is a very
dangerous symptom, especially if attended with any degree
of hiccup. Frequently profits; sweets pour forth all at
once about the mouth, tenth, or twelfth day; a commonly cold-
fish or clumsy on the extremities; oftentimes very thin Hools
are discharged, both the one and the other are generally
colliquative and very weakening. However, a warm
moisture of the skin is generally salutary, and a gentle diar-
hras frequently carries off the delirium and comatose dif-
position.

Now nature finds space, the extremities grow cold, the
nails pale or livid, the pulse may be said to tremble and
flutter, rather than to beat, the vibrations being so exceed-
ing weak and quick, that they can scarcely be distinguished;
though sometimes they creep on surprizingly slow, and very
frequently intermit. The fick become quite irritable and
stupid, scarcely affected by the loudest noise or the strongest
light; though at the beginning strangely susceptible of the
impressions of either. The delirium now ends in a pro-
found coma, and that foom in eternal fleep. The fleets,
urine, and tears run off involuntary, and denote a
speedy diffufion, as the vall tremblings and twitching of
Y y the

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The nerves and tendons are precluded to a general convulsion, which at once stops off the thread of life. In one or other of these ways are the sick carried off, after having languished for fourteen, eighteen, or twenty days, nay sometimes much longer.

All persons grow deaf and stupid towards the end of the disease, some extremely deaf, though too quick and apprehensive in the beginning, insomuch that the least noise or light greatly offended them. Many, from their immoderate fears, seem to hurry themselves out of life, where little danger was apparent at the beginning; nay, several will not suffer themselves to sleep, from a vain fear of dozing quite away; and others from the wretched anxiety, and confusion which they are sensible of in it, or at waking. Where the deafness ends in an impairment of the ear, it is generally a good symptom; and if it is when a person is alternately perspiring, or a large pustular angry eruption breaks out about the lips and nose.

The feverous fever attacks persons of delicate constitution, who have suffered great evacuations, a long delirium, and immoderate watching, studies, or fatigue, as well as others who have used much crude unwholesome food and drink, or have been long confined in damp foul air, or exposed to other caustics of debility.

It is obvious that, in this species of fever, there is no opportunity of using strong measures, especially great evacuations, either by bleeding, or active purging, nor is the affection amenable, where the heats are moderate, partial, and transient. A very mild emetic or gentle laxative may be advisable in the early stage of the fever; as a little rhubarb, Epipol, rhubarb, &c. But Dr. Huxham advises, "if you give any thing draught, be assured your patient will rise for it, and you will repent it." Moderate diaphoretic medicines, with a well regulated diet, but nutritious regimen, are the remedies principally applicable to this form of fever. This regimen itself, judiciously managed, Dr. H. remarks, "will go a great way in the cure, assisted by well timed and well applied blisters, and a due care to keep the patient as quiet as possible both in body and mind." He rejects strong opium, as commonly pernicious; but where the lowness and delirium are very considerable, allows of a little more stimulating plan; as the use of camphor, caffor, and sal friction, with thin wine whey, or gruel with a little wine; and as the disease advances, a little chicken broth, fago and wine, &c; the wine being especially serviceable where profuse colicky fweats occur. As no violent measures can be adopted in this fever, with a view to hale it termination, the principal treatment necessarily consists in supporting the strength, without adding much to the excitement; for which purpose a gentle cordial diaphoretic regimen is requisite, especially towards the decline of the disease. There is seldom any very marked crisis; and time only seems, in general, to wear off the fever. A gentle diarrhea is sometimes of manifest service, indeed, towards the end of the complaint, and the patient is always mott cold, when in a gentle perspiration; but when these discharges are great, they are never advantageous, but on the contrary skulk the strength of the patient extremely. There is no evacuation of a more favourable portent, than a pretty free salivation without aphtha; where this happens, Dr. Huxham observes, "with a kindly moisture of the skin, I never despair of my patient, however weak and stupid he may seem; indeed, the dearness many times makes the sick at the close of the displeasure appear much less sensible than they really are; not but that many, under these circumstances, escaping the grave, degenerate into mere idiots." (See Huxham on Fevers, chap vii. Manningham on the Febricula.) The disease, above described, is the typhus minor of Dr. Cullen's classification.

Fever, Pesticial, a fever which spreads rapidly and extensively, and is destructive to numbers, whether typhus, the plague, scarlet fever, &c. See Epidemic, and Plague.

Fever, Pesticial, called also pectoral, puncticular, and phlegmonous, is a term applied to typhus, or other fevers, in which the purple spots, resembling flea-bites, and denominated petechic, punctular, &c. appear upon the skin. These spots are considered as marks of malignity and putrefaction, as above mentioned, in the description of the symptoms of the advanced stage of continued fever. See Pustule, and Petechia.

Fever, Puerperal, or child-bed fever, a fever which occurs within a few days after parturition, and is connected with an inflammation of the peritoneum, or membrane lining the cavity of the abdomen; hence its nomenclature of Peritonitis purpuratus, which is also Puerperal fever.

Fever, Purpura, the same with petechial, (see above) so denominated from the ordinary colour of the petechiae, which, in the language of the nurses, are called the purpura. See Puerperal, and Petechia.

Fever, Purulent, a term applied to all the forms of fever, whether typhus, intermittent fever, scarlet fever, plague, yellow fever, &c. in which there is extreme prostration of strength, with black and offensive discharges, hemorrhages, and purpura spots; with what propriety will be discussed under the head Purulente fever, which see.

Fever, Quotidian, and quotidian, appellations of intermittent fever, when the fit occurs every third day, or every day in succession. The word quotidians, signifying daily, might appear to be erroneously applied; but physicists reckon the day on which a crisis commences the first, and consequently the third day after this is the fourth of the disease; in continuing the calculation, therefore, the day of every successive paroxysm is again reckoned, viz. as the fourth of the preceding period, or cycle, and the first of the succeeding cycle. In like manner, the intermittent, which occurs on the alternate days, is denominated a tertian. The common people, however, denominate the quartan a third day age, and the tertian a second day age, not being acquainted with the more complicated medical calculation. See Ague.

Fever, Remittent, a fever consisting of periodical increases and abatements, but without an interval of freedom from the symptoms, as in the intermittent. See Remittent.

Fever, Rheumatic, a term applied to rheumatism, when accompanied by a general febrile condition, and which is then more commonly and correctly termed acute Rheumatism, which see.

Fever, Semi-tertian, that form of remittent fever in which there is daily exacerbation and remission, (see Ferrii amphiemorina) but on alternate days the exacerbation commences with rigor, or great chilliness and shivering; as if a tertian were joined with an ampheric fever. This is the hemitritis of the Greek writers; and the Amphiemorina hemitritus of Sauvages. (Nofol. Method, cl. ii. genus 6. species 7.)

Fever, Ship, is the typhus occurring in crowded vessels. See Typhus.

Fever, Scarlet, a fever of the exanthematic or eruptive class, which, like the small-pox, measles, &c. is propagated by a specific contagion, and occurs but once during the life of the individual. It is characterized by a close efflorescence, of a scarlet colour, appearing on the surface of the body,
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The pulse, during the eruptive stage of simple scarletina, is usually very quick and feeble. The tongue exhibits on its upper surface a whitish fur, through which the elongated papillae extend their scarlet points; the sides of the tongue are of a darker red colour. The urine is clear, and of a bright straw colour. The face is considerably tumefied. There is usually great restlessness, with a desire of itching or tingling in the skin, and often slight delirium. These symptoms continue with more or less violence from three to seven days. A few patients escape without fever, pain, or any particular uneasiness.

This disease, although now known to arise from a different species of contagion, has been considered by many authors as a variety of the measles, and, as the two diseases resemble each other, so as to be occasionally mistaken, we shall recapitulate the diagnostic characters, as pointed out by Dr. Willan.

1. The efflorescence in scarlet fever generally appears on the second day; in the measles it is seldom visible till the fourth. 2. It is much more full and spreading in the former than in the latter disease, and consists of innumerable points and spots under the cuticle, intermixed with minute pimples, in some cases forming continuous, irregular patches, in others coalescing into an uniform flush over a considerable extent of surface. In the measles the rash is composed of circular dots, partly distinct, partly set in small clusters or patches, and much less elevated, so as to give the impression of roughness when a finger is passed over them; these patches are seldom confluent, but number of crescents, or segments of circles, with large intervening portions of cuticle, which retain their usual appearance. The colour of the rash is also different in the two diseases, being a vivid red in the scarlatina, like that of a hol. lather's shill; but in the measles a dark red, with a tinge of a raspberry. 3. During the first stage, the measles are distinguished by an irritant parsi cough, with expectation of a tough serpiginous phlegm, by an inflammation of the eyes and eye-lids, with great tenderness to light, by an increased circulation from the chylial gland of the face, &c. The scarlet fever is also frequently attended with a cough, and with red cheeks of the face; an extension of the rash to the tuncia albuginea, circumstances which render the distinction between this complaint and the measles particularly difficult, if other symptoms be not clear and decisive. On minute examination, however, it will be generally found, that the cough in scarlatina is thinner and irritating without expectoration; that the redness of the eye is not attended with intolerance of light, that the ciliary glands are not affected; and that, although the eyes appear shining and watery, they never intermit. 4. When the rash appears on the third or fourth day, being scattered, and of a dark shade of colour, as respects its appearance in the second and third form of scarlatina, the disease may be distinguished from measles by the appearance in the throat, by the rigidity of the muscles of the neck, and other peculiar symptoms hereafter to be described.

For the care of scarlatina simplex, it is only requisite to keep patients in a moderately cool and equable temperature, in clean open apartments; to prescribe light diet, without animal food; and to give cooling liquors to drink. When there is no morbid appearance or inflation in the throat, our chief care should be to prevent needless applications; hence, according to Sydenham's observation, "more die of this disorder except from too great efficacies in the practitioner." It is but nominally a disease, he says, unless the patient is imprisoned in bed, and medicines are poured in "nimas docti et ferendum est."; then "mor-
we can read:

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bus inuis intedis, et ager non raro nulla alia de causa, quam nimia medici diligentia, ad plures migrat.** *(Sec. vi. cap. 2.)* We wish that this were popularly understood; for, alas! we have a great many patients, when concluding their life, with FEVER in general, that friends and nurses will not be content without more decisive proofs of the learning and art of the doctor, whose most difficult task is, therefore, to prevent their active interference in such cases, by seeming to be active himself.

II. Scarletina anginae, or scarlet fever with sore throat, is more severe than the preceding. In this species of the disease there is superadded to the fever and efflorescence a considerable swelling of the tonsils, velum palatum palati, and uvula, accompanied with a florid redness of their whole surface, often terminating in numerous fluid ulcerations. The primary febrile symptoms are in this species the same as in the former, but more violent. The affection of the throat sometimes begins with the fever, at other times is not perceptible till the scarlet efflorescence has arrived at its height; most frequently it is felt when the rash appears, and increases and declines with it. A sudden leision of difficulties in the malleable of the neck, and lower jaw, takes place at the beginning of the disease. On the second day of fever the throat is rough and thickened, the voice becomes hoarse, and deglutition is performed with pain and difficulty. These symptoms are attended on the second, third, and fourth day, with nausea, vomiting of bile, headache, delirium, colic, and great heat, with a febrile flattening pulse, a quick respiration, and extreme languor or faintness. On examining the throat there appears a considerable enlargement of the tonsils, and a florid redness of their surface, which extends over the palate and the posterior part of the throat. The tongue also assumes a high red colour, and the papilla over its whole surface are greatly elongated. In some cases no further change is observable in the fauces, neither do the appearances above-mentioned continue beyond the fifth or sixth day: no deep or considerable ulcer forms in the tonsils. Slight imperfect ulcerations are very frequent, and more especially at the latter end of the year. They occur at an early period of the disease, as on the second or third day, sometimes later. The formation of them is preceded by a very quick respiration and the various difficulties of the throat. Small white patches are then visible over the pendulous part of the palate and the tonsils; at the same time, the red colour in those parts becomes darker in some places than in others, so that the whole surface has a peculiar speckled appearance. Soon afterwards, fissures or excoriations take place at the centre of the white patches, which are almost immediately covered with whitish leucous. When these are numerous, the throat is constantly clogged with a large quantity of tough vivid phlegm; hence the difficulty of swallowing is increased, and much pain is felt upon pressure externally applied. The leucous are in some cases removed about the fifth or sixth day, at the decline of the efflorescence; in other instances they continue to the eighth day, or even later; and when they separate, partial excoriations remain, which may, however, be readily healed.

The efflorescence, in this form of scarlet fever, differs in a few particulars from that bestowed under the head of scarlatina simplex, 18. It does not appear so early in the disease, but is often delayed to the third day. 2dly. It does not so constantly extend over the surface of the body, but comes out in scattered patches on the back, sides, neck, and breast, or about the joints. 3dly. It sometimes wholly vanishes the day after its appearance, and re-appears partially at uncertain times. Hence, 4thly, the whole duration of it is longer than in scarlatina simplex. These variations are most frequent during the autumnal and winter months, when the disease is in general less virulent.

During the state of extreme debility, which usually succeeds the scarlatina anginae, some patients are affected with anaphalous swellings of the face and hands, but more especially of the lower extremities. The swelling becomes conspicuous about the eighth or tenth day from the disappearance of the rash, and continues for two or three weeks. In cases exhibiting a very full and vivid efflorescence, the anaphaeas take place more frequently, and to a greater degree. When the throat is much ulcerated, and the rash not extensive, and when no desquamation of the cuticle succeeds, droopish swellings regularly appear. Occasionally, though very rarely, effusions of serum into the abdomen, or thorax, or the ventricles of the brain, take place. An enlargement of the parotid glands happens frequently in adults, and continues a long time without desquamation. Children, at every period of the disease, are liable to tumours both of the parotid and sub-maxillary glands, sometimes ending in tedious and painful abscesses. With these they have, during the latter phase of the disease, ulcerations at the corner of the mouth, pimyous phlegm in the ear, swelling of the upper lip, and purulent discharges from the ears, sometimes accompanied with deafness: they are also subject to pustules or small ulcerations of the tongue, which prove troublesome for some days, but without any serious consequences.

During every epidemic scarlet fever many cases occur in which the efflorescence is confined to the throat and mouth, there being no appearance of a rash on the skin: but the febrile symptoms, vomiting and delirium, continue violent for several days. A crimson colour of the throat is perceptible often before the fever commences; in the course of which numerous small specks of ulceration are formed on the tonsils, &c. and become, in many places, confluent, when the increased secretion of phlegm, the tumour, pain, and difficulty of swallowing, occasion great distress. This complaint seems peculiar to adults, and is evidently a species of scarlatina, because it affects some individuals of large families, while the rest are labouring under other forms of the disease, and because it is capable of comminuting, by its own power, into a number of individuals. It is generally gone through the scarlatina angina experience, while con- valescent with the sick, very much les. The disease remains, however, free from fever, although the swelling and inflammation of the tonsils be considerable.

The cure of scarlatina anginae requires a more active administration of remedies. Although blood-letting has been recommended by Mortor, De Iac., and others, the experience of our later writers on this subject coincides in deeming it injurious. Dr. Willan says, wherever it had been employed, great depression and faintness were the immediate consequences, the pulse becoming more weak and frequent, and often irregular. And Dr. Withering disconunents even local bleeding. Sometimes, where the fiery redness of the eyes, and the state of delirium seemed to demand the application of leeches to the temples, he observes, "I have found them applied, but never with any good effect."

Emetics are recommended by all the best writers on this disease, among whom, indeed, there is very little difference of opinion on the subject. "In the very first attack," says Dr. Withering, "the vomit fails to remove the disease at once; if the poison has begun to exert its effects upon the nervous system, emetics stop its further progress, and the patients quickly recover. If it has proceeded still farther, and occasioned that amazing action in the capillaries which
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which exits when the scarlet colour of the skin takes place, vomiting never fails to procure a reprieve to the anxiety, the faintness, and delirium." "In the throat, when the throat was more affected, when the tumescence of the face was such that the patients could not swallow, but with the utmost difficulty: when the peripneumonic symptoms threatened suffocation, and bleating was ineffectual, an emetic opened the gullet, and unloaded the lungs, so that deglutition became easy and respiration free. But it is necessary to add, that a vomit only sufficiently strong to evacuate the contents of the stomach is by no means adequate to these effects. The vomit must be powerful, and, in ordinary cases, repeated once in forty-eight hours; in those with more urgent symptoms daily; and in the worst cases twice in twenty-four hours. The patients never fail to express the relief they find after the operation, and the physician soon discovers it in the countenance and pulse. As to the form of the emetic, the practitioner may vary it as he pleases; but I generally combine tartar emetic in solution with ipecacuanha powder, that I may be more certain of their full effect on the stomach, and avoid the danger of their acting as a purgative. I also give them much larger doses than usual, in order to secure a certain violence of action upon the system." (Withering on Scarlet Fever, page 75-8.)

Dr. Rush recommends this repetition of vomiting, but he also "gave calomel in moderate doses in every stage of the disorder." Dr. Wilkins agrees with these physicians, in the propriety of administering emetics, but has never found it necessary to repeat them so often as Dr. Withering has advised.

With respect to purgatives, Dr. Withering, it is obvious from the above quotation, considered them as dangerous; and Dr. Willan affirms, that they "have nearly the same debilitating effect as blood-letting. They are indeed very seldom necessary," he adds, "for though a few patients may, on the first day, be afflicted with bilious vomiting and diarrhoea, the state of the bowels is more uniform than in other febrile complaints." Nevertheless, he thinks the occasional stimulus of a small dose, as two or three grains, of calomel, very useful. Dr. Bills expresses an acknowledgment to a brother practitioner, "for his removal of a prejudice against laxatives in the early stage of the disease, imbied from various authors, and confirmed by the dreadeful consequences I had seen when a diarrhoea came on in this fever. By his persuasion small doses of calomel and other laxatives were occasionally given; and so far from producing injury, I believe, that by evacuating the acid matter, which is often swallowed, they had a tendency to prevent exacerbations of the intestinal canal, and the consequent diarrhoea which I dreaded." (See Willan on Cutaneous Diffuses, part ii. p. 357.)

Dr. Hamilton of Edinburgh has, however, shown us that such prejudices were completely unfounded, and that moderate purgatives of calomel and rhubarb, or jalap, in the early stages of scarlatina, are as beneficial as in simple fever; and he even considers them as supereding the exhibition of emetics. We believe that both the remedies are advantageously administered; and that a laxative of the bowels, produced by medicine in the early stage, tends to prevent the diarrhoea of the succeeding periods, as Dr. Billis remarks, and as is also probable in common fever.

In cases of scarlatina angina, where the throat is inflamed and swelled, fo as to occasion very painful deglutition, Billi. ss applied to the external fauces, or between the shoulders, afford considerable relief.

It is proper to enjoin the same adherence to the antiphlogistic regimen as in the simple form of scarlatina, or as mentioned under the head Fever, particularly with regard to cool air, cool drinks, and light coverings; the cutaneous heat arises to a higher degree in this than in any other febrile disease in this country. If the thermometer be applied to the surface of the body," Dr. Currie observes, when speaking of this fever, "after the sensation of heat has become steady, the mercury will be found to rise to 105 and 106° even in mild cases, and in the more violent cases to 108, 109°, and 110°. I have known it rise as high as 112°, the greatest heat I ever observed in the human body." (See his Reports on the Effects of cold Water &c. vol. ii. p. 428.) Accordingly the experience of this excellent physician, as well as that of professor Gregory of Edinburgh, and of several intelligent correspondents, has ascertained that the external application of cold water to the skin is the most certain and effectual method of removing this disease. (See Cold, effects of, as a remedy.)

In this case, as in that of idiopathic fever, already described, the cold of the skin actually terminates the disease, when applied before the appearance of the efflorescence, and the cold washing, at subsequent periods of the disease, while the skin remains hot and dry, invariably diminishes all the febrile symptoms, and gives great relief to the feelings of the patient, as we have witnessed in numerous cases. Dr. Stanger, when speaking of the same general washing of the body, among the children of the Foundling Hospital, 7t of whom went through the scarlet fever, remarks, that "its effects in cooling the skin, diminishing the frequency of the pulse, abating thirst, and dispelling to sleep, were very remarkable. Finding this application so highly beneficial," he adds, "I employed it at every period of the fever, provided the skin were hot and dry." (See Dr. Willan's treatise, above quoted, p. 360.) With what success the cold affusion was employed by Drs. Currie and Gregory, in completely annihilating scarlet fever in its commencement, in their own children, will be remarked with pleasure by the readers of Dr. Currie's second volume, p. 457, and 455. While this remedy is used, Dr. C. observes, cold water and lemonade should be used as drinks, and the bowels opened, if necessary, by calomel. "It is left to myself I use no other means." We can add, that we have seen several cases, in which the patients rapidly recovered from a smart attack of the disease, in which the cold washing, by means of a figure, repeated from time to time as the heat was great, and a dose of calomel, were the only remedies employed.

We have before stated, that the effects of cold, applied to the skin, when there is excessive heat, and action of the cutaneous capillaries, is the most efficient mode of inducing sweating, the Cold, which, whether as a cause or a consequence and sign of the reduction of fever, has been generally an object of the practice of physicians. Many of them endeavour, in the first six days of scarlatina fever, to excite perspiration by antimonials, camph. arom. distillate, and vinegar, and vinegar with vinegar, and vinegar with vinegar. But Dr. Willan judiciously remarks, that before the decline of the efflorescence, such remedies and opposite coverings, for the most part, fail to produce their usual effects, and often increase the heat, anxiety, and restilence, which they were intended to relieve; and that before the decline he never succeeded in the endeavour to excite perspiration, yet perspiration is the almost certain result of the external use of cold water, properly employed.

The mineral acids have been found serviceable in scarlatina angina, and acidulated gargarines are generally useful, where the throat is much affected, and seem to carry off the virus with which the saliva is tainted, and thus to pre-
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vent the irritation of the bowels, which it occasions when swallowed. The use of bark in the first days of scarlatina anginosa is now given up by the majority of practitioners as detrimental; but it is generally admitted that, at the decline of the efflorescence, if the fever also declines, and is not succeeded by a cough, the bark, mineral acids, wine, and nutritious diet, obviates the debility and oppressive languor, which remain after the disease, and contribute to prevent the accession of dropy. (See Willan, loc. cit.)

III. The symptoms of the scarlatina maligna on the first day; according to the author just quoted, are nearly the same as in the scarlatina anginosa; but some of the following peculiarities are afterwards observable: 1. A small, indistinct, and irregular pulse, a brown or black infiltration of the tongue, teeth, and lips; 2. A dial reddish of the eyes, a dark red flushing of the cheeks, delicacy, delirium, or coma alternating with fretfulness and violence: 3. Breath extremely fetid; a rattling and laborious respiration, partly occasioned by a thick rough phlegm clogging the naso; a contraction of the jaws, and painful deglutition; a fulness and livid colour of the neck, with retraction of the head: 4. Ulcerations on the tonsils and adjoining parts, covered with dark bluffs, and surrounded by a livid line: 5. An acid discharge from the nostrils, causing foreheads, or chops, and even blisters, about the nose and lips, the fluid being at first thick, but afterwards thick and yellowish: 6. The rash is usually faint, excepting in a few irregular patches; and all of it presently changes to a dark or livid red colour; it appears late, is very uncertain in its duration, and often intermixed with purple spots, or petechiae. In some instances the rash suddenly disappears a few hours after it is formed, and comes out again at the expiration of a week, containing two or three days.

Patients with the violent of the first attack of malignant scarlatina have never declined to struggle through a fever of most fatal and formidable circumstances, continued far beyond the usual febrile period. The ulcerations gradually spread from the throat to the gullet, larynx, and wind-pipe. Violent pains of the bowels, and excitations about the knees succeeded; also hectic paroxysms, with suppurations of the glands, a tooting cough, great difficulty of breathing, pains in the side, and a remarkable alteration in the sound of the voice. A few recover after having been harassed, almost incessantly, for six or eight weeks. In the year 1768, when the scarlatina maligna was epidemic in London, more than two thirds of those affected with it died between the seventh and nineteenth day of the fever. The symptoms pertaining danger are, continued coma, drenches of the eyes, labours breathing, diarrhoea, petechiae, vices, and hemorrages. The degree of danger in the complaint does not depend on the greater or less extent of the rash on the skin; the fullest redness affords to decided security, nor is the total absence of it incompatible with a mild disease. Many patients sink under this disease, unexpectedly, at a very early period, as on the second, third, or fourth day, no symptoms having preceded, which could excite an apprehension of immediate danger. It has been thought that to huddle a mortality is owing to a gangrenous state of the throat, gullet, stomach, intestines, or lungs; and this opinion seems to be confirmed by dissections.

In the treatment of scarlatina maligna, a bold and persevering course of emetics, as recommended by Dr. Withering, is considered by Dr. Willan and others as the most effectual mode of obviating the singular malignity of this distemper. When administered in due time, lays the last-mentioned author, they very generally prevent the transition from the milder to the more virulent forms of scarlatina, and remove the febrile symptoms at the earliest possible period. In dubious cases, if powerful doses of ipecacuanha, either alone, or combined with tartarized antimony, entirely fail to produce their usual effects, it may be concluded that the most unfavourable state of the disease has begun, and that the patient's situation is extremely dangerous. Blister are seldom useful in this form of scarlat fever, and sometimes prove injurious. Bleeding and purging are always hurtful, according to Dr. Fothergill, Dr. Willan, and others; a strong cathartic, or even the application of a few leeches to the throat, frys the latter, has been known to produce an immediate sinking, and sometimes death within a few hours, in cases which were formerly excepted not favourable. But from the condition of Dr. Bines, above noticed, we learn that unreasonable prejudices have existed against purging, in other forms of this fever; and we cannot easily reconcile the enemions on strong and reiterated vomiting, with the extreme fears of moderate purging, at least in the commencement of the disease.

Fumigation of the throat with nitrous acid is recommended by Dr. Willan as useful in keeping the throat clean, and often superseding the necessity of gargles; but he admits that gargles remove the vile and offensive matter from the throat, and thus preserve the fauces and bowels from its disagreeable action. Those prepared with contravera, according to the directions of Dr. Fothergill, (Treatise on the Ulcerous Sore-throat, p. 63.) are the most grateful and advantageous; and gargles of a more stimulating quality have been used with benefit. In the Wcst Indies the favourite gargle is made with camphor or Cayenne pepper, which, though productive of much pain, is said to be very efficacious. Occasional immersions in warm water are recommended in this form of scarlatina by some practitioners. Dr. Currie remarks that the application of cold water is fearfully applicable to the scarlat a purpura, and that the tepid affusion makes little impression upon it. Dr. Willan has observed considerable advantage from the application of warm vinegar and brandy to the limbs, and to the greater part of the body.

When emetics have not been exhibited at a proper period, it becomes necessary, as the diæte advances, to direct cordials, wine, opium, Peruvian bark, mineral acids, &c. according to the circumstances of the case. In this point, almost all authorities, foreign and British, coincide. The diæte is then to be treated with other fevers of extreme debility, or malignancy, as it has been termed, which the gangrenous tendency of the ulcerations, as well as the other symptoms, manifestly indicate.

IV. In the ulcerated sore throat, which affects adults without any eflfluence on the skin, emetics, given early, according to Dr. Willan, prove of great advantage, and the treatment recommended in the febrile stage, will be found effectual. Gargles, whether acid or dextrin, if very sharp, or if injected forcibly enough to remove the bluffs, occasion much pain, and often protract the disease. Dr. Wall, Dr. Johnstone, Dr. Rush, and others, recommend the inhalation of the vapour of myrrh and vinegar. Dr. Willan is of opinion, that Dr. J. Carmichael Smyth's mode of fumigation, by pouring heated oil of vitriol on powdered nitre in a proper vessel, is entitled to a preference. The refreshing antifeptic vapour, he says, detached by this process, and circulated through the room, perfectly clears the patient's throat, and at the same time removes the factor both of the breath and perpiration. (Loc. cit. p. 568.)

It is truly singular, that the slightest of all eruptive fevers, and the most violent, the molt fatal diæte known in this country, should rank together and spring from the same origins.
FEVER.

origin. Experience, however, has decided, that the scarlet fever, the scarlatina anginosa, the scarlatina (or angina) maligna, and the scarlet ulcerating fore-throat without the efflorescence on the skin, are merely varieties of one disease.

That all of them proceed from the same source of contagion is evident; because under the same roof, in large families, some individuals have the disease in one form, some in another, about the same period. According to the state of the air, the foil, climate, or season of the year, one form predominates over all the rest, and gives the general character to every epidemic scarlatina. Hence aside the various accounts and opinions respecting it, which are to be found in medical writers. Dr. Currie, however, remarks, "that the varieties of scarlatina are, in fact, not greater than the varieties of the small-pox, to which they bear a very strict analogy." (Reports, vol. ii. p. 427.) It is now understood, that the scarlet fever is liable to attack the same individual but once in his life; an occasional exception only occurring in this, as in the small-pox, measles, and other eruptive fevers. (See Dr. Binns' account, in Dr. Willan's Treatise, p. 283.)

Dr. Withering says, "I have never yet seen an instance of the scarlatina having the scarlet fever twice, and I believe it to be as an improbability as a repetition of the small-pox." (p. 53.)

The scarlet fever spreads rapidly by contagion, especially among children. (Adults are not very susceptible of its influence,) and the symptoms often commence on the third or fourth day, and the eruption appears on the fifth or sixth, after exposure to the contagion. Not only does the contagion extend itself rapidly, but when it once finds its way into large families, schools, &c. it is with great difficulty arrested in its progress, even by keeping the infected separate from the rest, by strict attention to ventilation, and to cleanliness throughout the house. (See Contagion.) This was strongly exemplified in the year 1803, in the small-pox, the quakers at Ackworth, in which, notwithstanding the active adoption of these measures, under the judicious management of Dr. Binns, 171 persons were affected with scarlatina, and the disease continued there upwards of four months. (See the whole account in Dr. Willan's Treatise before quoted, p. 53) (et seq.) Nevertheless, these measures of prevention are advisable in all similar instances, and in smaller academies than that of Ackworth they have been found effectual, when carefully pursued. Dr. Haygarth relates an instance, in which thirty-seven boarders in the family of a clergyman were infected by the infection, brought to the school by one boy, by immediate separation of the latter. "My patient's chamber was situated in the middle of the house," Dr. Haygarth observes, "at the landing of the first pair of stairs. All the scholars went close past this door several times a day. The rules of prevention were placed on the door, and rigid attention to their faithful observance was required. The event fully justified my hopes. Though all the thirty-seven scholars remained in the same house and family during the whole disease, yet not one of them was infected." At this time Winchester, and several other large schools in England, sent home and dispensed their scholars, on account of this disease, which had alarmingly spread among them. (See Dr. Haygarth's letter to Dr. Percival, p. 81.) See also Dr. Withering on Scarlet Fever, p. 67, and Dr. Black- bourne on the same, p. 21.) All these writers give a caution against the usual practice, on the appearance of the disease, of hastily dispelling the scholars, who may, after returning home, diffuse contagion in their respective families and neighbourhoods. As we deem this subject of high public importance, we shall make no apology for transcribing the active measures which were adopted, under the superintendence of Dr. Blackburne, with success in a large academy.

"In a numerous school, near town, where the scarlet fever had infected several young gentlemen, in consequence of one of them being suffered to associate with his schoolfellows, in a few days after his recovery from the complaint, which he had brought with him from home, it was effectually extinguished, and was attended with no unpleasant consequences, by adopting the following means. When it became evident that the convalescent had infected the school, he was withdrawn, and apartments allotted to him, completely separated both from the healthy and the sick: to which apartments, it will be seen, the sick were removed after a certain period of convalescence. The infected were then conveyed to an adjoining house, and the doors, which communicate between it and the bed rooms of the school, were closed up, to preclude the possibility of any intercourse. The sick were there attended by nurses, the regard of the family being kept entirely from them; and to prevent effusively the progress of any farther mischief, not only their linen, but even their knives and forks, and plates, &c. were appropriated solely to their use; and nothing belonging to them was suffered to enter the house, where the healthy still remained. One of the family, who was necessarily called to superintend the management of the sick, went at no time during the illness near the school, from an apprehension of conveying the infection, but confined herself to the care of the invalids. The school-room, dining-hall, and all the bed-rooms, supposed to be infected, were immediately cleared out, and nothing but the bare walls left; they were then white washed and disinfected; the young gentlemen in the mean time occupying apartments, which were known not to be infected, and which were afterwards also disinfected with the same form. All the blankets, counterpanes, &c. throughout the house were furred: the rooms and staircases were sprinkled with vinegar; the bedheads were taken down, well scrubbed, and fumigated with vinegar; and for some time the feather-beds were exposed to the open air, and also sprinkled with vinegar. During this period, however, and for several days, some who had originally taken the infection, but not shown the symptoms so early as the others, were successively taken ill. They were of course removed from the school, and their bedding, clothes, &c. sent with them to the sick house. Thus, it being generally imagined, that no infection could be conveyed in the first stage of the complaint, it was concluded, that such young gentlemen as had escaped in the first infallibility were, by the afore-mentioned precautions, now secured from all possible danger; and the event satisfactorily proved, that none of those who fell ill in the school had, at the time, infectious influence. The young gentleman, who was last taken ill, showed the symptoms on the eleventh day in the midst of the school, and with him it stopped. (See Facts and Observations concerning the Prevention and Cure of Scarlet Fever, &c. by W. Blackburne, M. D. 1803, p. 21.)

The origin of the disease in this school, namely, from a convalescent boy, leads us to an important question respecting the period after the cessation of the infection, when the patient ceases to carry infection about his person: as well as the consideration of the means of diminishing its infectious power. Dr. Willan remarks, that in making the separation here recommended, we must be guided on the supposition, that persons under the influence of contagion do not communicate it till they are actually affected with the fever and efflorescence." He adds, "it is to be remarked, that convalescents from scarlatina, notwithstanding
ing a minute attention to cleanliness and change of apparel, remain, for two or three weeks, capable of infecting persons susceptible, especially children, with whom they have intercourc. These periods I have been able to ascertain in several instances." (Loc. cit. page 387—8.) He therefore recommends the precautions adopted by Dr.斌 in, for purifying convalescents previous to their intercourse with the healthy, as not more than sufficient for the purpose. "When the blisters and blots in the throat were wholly removed," says Dr.斌, "the patients layed a few days in the convalescent rooms, and had an opportunity of walking in the garden, at the front of the house, to clear themselves from infection by repeated exposure to the open air. After this they went across the garden to a walk-house, about equally distant from the fever-house and the school, where they were entirely stripped, and washed with soft-soap, particular attention being paid to cleaning their hair. They then put on fresh clothing, and went up to the rooms in the school; being, however, kept apart for some time longer. Their bed and bedding lines was frequently changed on their return, as it before had been in the sick-rooms. When they had continued thus about a week, and appeared to have recovered their strength, the general ablation was repeated; and after rambling in the fields for some hours, they were permitted to mix with the other children." (See Dr. Willan's Treatise, p. 384.)

From these details, the principles upon which the prevention of the spreading of the infectious contagion of scarlet fever may be accomplished will be obvious; and in order to be effectual, they must be pursued in the strictest and most rigid manner: for, as we have already pointed out, the extent to which infection is communicated through the air is extremely limited; (see Contagion,) and therefore a perfect separation and interdiction of intercourse by persons, clothes, utenils, or other things, will infallibly prevent its communication. And as all the forms of the disease may be produced in the same family, from any one source of the contagion: the precautions above specified should be observed on the appearance of the simple scarlatina, as well as when our attention is called to the more dangerous forms of the disemper.

With respect to the history of scarlet fever, our limits will not allow us to enlarge greatly on this curious and interesting part of the subject: we must content ourselves with a brief sketch, and refer the reader, who may be de- livered of a more comprehensive view of the progress of the disease, to Dr. Willan's elaborate account of the facts, in his treatise on Cutaneous Diseases, to which we are indebted for much of the information contained in this article.

The scarlet fever does not seem to have been known in this country more than 150 years; for Sydenham and Morton are the first English writers who mention it. Sir Robert Sibbald, physician to king Charles II., for Scotland, says, in the year 1680, this disease had appeared for the first time at Edinburgh, and was so little understood, that he could not venture to give any observations respecting it. Sydenham only mentioned the simple form; but Morton has described the symptoms of scarlatina anginosa, and some cases of the malignant form, which he considered as a variety of measles. (See his treatise De Morbillis et Fecr Scarratinis, cap. iv.—v.) During the 18th century the disease was frequently epidemic in Britain, and has been amply described by Hoopman in 1734; Fothergill in 1758; Cotton at the same time; and subsequently by several other authors. On the continent of Europe, however, from a much earlier period, it has frequently raged, and ravaged towns and districts, with all the virulence and fatality of a true plague. It has been described again and again, by successive observers in different situations, as a new and unknown disease, and under a great variety of denominations.

The first account of scarlatina on record is that of Ingraaffia, a Neapolitan physician, about the year 1503; it was then known by the name of Roffullus at Naples. (See his Treatise de Morbo, puerperien naturæ, trad. in cap. t.) We next find the disease epidemic in Holland in 1517, in its malignant form, as described by Furfuris; and through Lower Germany in 1565 and 6, as described by Wierus, as a pestilential fore-throat. A few years afterwards the same disease was epidemic in Paris, and called by Balbini rubido, which he carefully distinguishes from the meadles, morbilli; the mortality of the diftemper in the autumn of 1555 was dreadful, especially among children. The scarlet fever and fore-throat is to be traced again in the garrettella of the Spaniards, which occurred after the influenza of 1580, and remained among them forty years, spreading to all the ports of Italy, Sicily, and Malta, and reaching Naples in 1618, where, as in Spain, it was described as a new disease, under a variety of new appellations, and is said to have destroyed 500,000 persons within two years: it was particularly fatal to children. This statement, however, is doubtless exaggerated. During this period, we find, from the writings of Semelius, Dorminio, and others, that the middle form of scarlet fever prevailed in different parts of Germany; and were described under the titles of morbilli igni, roffilæ, erytipalæ, and universal erytælæ. It was again described as a new disease under the title of "fæbris miliares rubra," which is said to have appeared at Leipzig in the middle of the seventeenth century. It was also called "fæbris cocciæ," and "fæbris purpureæ," by other writers at Leipzig. The scarlatina spread through Poland in the year 1665, and has been well described by Schultius under the denomination of "purpurea epidemia maligna." (See Act. Acad. Natur. cur. dec. i. ann. 6. 7. p. 206.) It was extremely fatal among infants and children. A few years after this it was noticed by various authors in Denmark, Holland, Switzerland, Lombardy, Bavaria, Austria, England, and Scotland. It raged at Berlin, under the form of scarlatina anginosa, from 1694 to 1751, and has been well described by its proper title, in the Acta Med. Berolin. dec. i. vol. 2, and dec. ii. vol. 5. § 3. Its subsequent appearances in different parts of Germany and Italy, until the middle of the last century, are noticed by several writers on the febris miliares, purpura miliares, purpura rubra, purpura febris, morbilli maligni, &c. And Dr. Willan has, in another part of his work, stated reasons for believing the "putrid measles," described by Sir William Watson, as in fact a malignant febrilis. (See Dr. Willan's Treatise on Cutaneous Diseases, pp. 328—350. p. iii.)

Fever. Spotted, the same with petechial, and purple fever. See above.

Fever, Tertiary, an intermittent fever, the paroxysms of which occur on alternate days, as explained above. See Fever, Quotidian.

Fever, Typhoid, or typhus, or subcutaneous Typhus, febris typhoides, πίερνος τέκες, of the Greeks, the opposite of inflammatory fever, or fever with debility, including the nervous, contagious, malignant, and putrid fever of authors; as well as the varieties denominated, from the local circumstances of its origin, gallo, hospital, and ship-fever; or, from the predominance of particular symptoms, brain-fever, internial, galls, and melenitic fever, purple, spotted, petechial fever, &c. It is the ordinary fever of temperate climates,
climates, and its symptoms, causes, nature, and treatment, may be considered as having been diffused above, under the general head of Fever. See Typhus.

Fever, Vascular, a term applied to a febrile disease, of the exanthematous class, which is principally characterized by an eruption of large watery vesicles; it is more commonly denominated Pemphigus, which see.

Fever, Worm, an appellation given by some writers to the febrile disorders of children, connected, or supposed to be connected, with the irritation of worms in the intestines. See Infants, Diagnoses of, and Worms.

Fever, Typhus, a name given to the endemic fever of hot climates, from the yellowness of the skin, which commonly occurs in the latter stage of the disease.

This fever, which has rendered the West-Indian islands, at different periods the grave of Europeans, and has ravaged the cities of America, has been the subject of great difference of opinion among those writers who have had an opportunity of witnessing its phenomena: it was therefore not easy to decide, at a distance, upon the points which they have left in dispute. We shall endeavour to give a succinct view of those facts which appear to be most satisfactorily ascertained; beginning with the symptoms of the fever.

The approach of the yellow fever is often announced by a feeling of latitude, heaviness, oppression, loss of appetite, and flight headache, which in a few hours, or on the following day, is succeeded by the violent symptoms of the disease. Sometimes, however, the attack is sudden and violent from the first; the patient is seized with a faintness and giddiness of the head, with a flight degree of chilliness and horror, but never with a complete rigor or shivering; these feelings are immediately followed by a high degree of fever, an arid and searing heat of the skin, accompanied by acute darting pains in the head and back, and often down the thighs and legs, and a strong beating of the arteries, particularly of the carotid and temporal arteries; the face and neck are flushed and turrid, the eyes red and protruding, with a sense of burning heat in the eyeballs, and the countenance is grim; great anxiety and oppression are felt at the precordia, with an intense burning pain at the loins, and almost continual shickens, which increase as the disease advances, with violent rendingings, in which bilious matter is brought up, afterwards a dark coloured, and sometimes a bloody fluid. There is extreme repletion, and a heavy respiration, with much fighing; the pulse is quick, generally full and strong, but oft; in some cases quick, low, and vacillating. The urine is deep coloured, and in small quantity. These symptoms continually increase; the respiration and vomiting become almost incessant, the anxiety excessive, the sighing frequent, and the shickens such that there is a continual toiling, and no ease in any posture, little or no sleep, and that disturbed, uneasy, and without refreshment to the sick. These symptoms generally continue to the third day, but sometimes not longer than the first, or second day, or even a few hours, and in others to the end of the fourth day, and may be considered as constituting the first stage of the disease.

The second stage begins with an abatement of many of the preceding symptoms, often with a deceitful apperance of a general remission of the fever. The vomiting, headaches, and burning heat, greatly abate or nearly disappear, the pulse loses its strength, and falls to nearly the usual frequency of health in many instances, but is always low and feeble. "Sometimes," says Dr. Mofley, "in this period of the disease, the symptoms are so mild, and the patient so tranquil, that the disease is supposed at an end, and all means neglected, or thought unnecessary, until the form appears that succeeds this fatal calm, arrayed in those dreadful forms, which are characteristic of the concluding stage, and completes the catastrophe." (Treatise on Tropical Diseases, page 411.) This interval, however, is often extremely short, so that the disease passes at once from the inflammatory stage to the black vomiting. At all events, either a repetition of similar violent symptoms soon takes place, accompanied with marks of greatly diminished energy, or the patient sinks at once into a comatose state, only interrupted by vomiting of a dark coloured, purulent fluid. The lochmous rejects every thing; the thirst, which in some is excessive, in others is moderate; and the skin is moistened with partial clammy sweats. The eyes were before red and inflamed, now become tinged with yellow; and this yellowness begins to appear round the mouth, eyes, temples, and neck, and soon after diffuses itself over the whole skin, varying in intensity from a yellow hue to a deeper orange tint; in many cases, however, it is altogether absent. The yellowness seems to usher in the concluding and most fatal symptoms of the disease; and growing deeper coloured, as the other symptoms become aggravated, is the immediate forerunner of death. The last symptoms are a deep coma, with a heavy respiration or convulsive kind of sighing, a low, creeping, and intermitting pulse, delirium, and constant repletion and fghing, fainting speech, trembling, starting, of the tongue, muttering of a black, bloody, and foamy fluid, and foams of a similar nature, haunorrhagies or oozing of blood from the mouth and nostrils, sometimes from the corners of the eyes and ears, black urine, livid spots or blotches about the skin, great coldness of the extreme parts, muttering, and death, either in a convulsive struggle, a state of torpid apathy, or sometimes in a calm and collected resignation of life. (See Hillery on the Diseases of Barbadoes, 2d edit. p. 152. Mofley, loc. cit. Lining, in the Edinburgh Phys. and Literary Essays, vol. ii. art. 29.)

The preceding description corresponds, with the general order and manner of the disease, when the patient dies from the third or fourth to the seventh day. But many patients do not experience all the symptoms above mentioned. Some have no chilliness at first, nor faintness, nor flushing in the face, and the pulse is sometimes deeply depriwed, and not quick; and there are gross habits of fey, which have been attached to the previous illness, in which the inflammatory period has been only of a few hours duration, and the transition so rapid, that the black vomiting, and the gorgonous condition have unexpectedly appeared, and terminated the life of the patient in twenty-four, or thirty-six hours. And, on the contrary, there are some instances where the disease has been protracted to the eighth, ninth, or tenth day; and others where it has never passed from the inflammatory stage; but being checked, though not extinguished, it has been lengthened out, and at last converted into a remittent of great duration, of most difficult cure, and of doubtful issue. (Mofley.) In other cases, it does not pass through those stages, nor put on the most characteristic symptoms of the disease. Speaking of the yellow fever in December, Dr. Pickard says, "Many of the sick now fall into a state of coma, and without exhibiting any other striking mark of illness, without uttering a complaint or a groan, lie down, very soon slip into the arms of death. The countenance becomes pale; the hair becomes a clay or lead-coloured hue; a deep sense of smothered grief; the patient lies in a state of tranquil insensibility; and without yellowness, or the other common marks of the fever, and in the course of a few days he slips to a cold death!"
Sometimes only a few hours complete the course of the disease." (Notes on the West Indies, vol. iii. p. 198.)

These various anomalies in the fever arise from the different fections in which it occurs, the difference of constitution, and habits of life of the patients, as well as of the predisposing and occasional causes, the early treatment, &c.

The greatest diversity would appear, during all the periods of the yellow fever, arises from the state of the proconsul, the burning heat, the anxiety and oppression, the constant vomiting, the extreme foreheads and uneasiness, composed of from the post partum at the pit of the stomach, all point to that region, which, in the words of Warren, "seems from the beginning to be the chief seat and throne of the furious conqueror." (In a treatise on this fever addressed to Dr. Mead.)

Hilley ascribed this particular and uniform suffering to the pericardium to the vicinity of the liver and gall-bladder; but it seems to be attributed with more correctness to the state of the stomach by others. For as Dr. Mofley observes, "this virusse seems to bear the chief burden of the disease, while life remains, and the principal internal vertiges of its effects after death." He observes, in another place, "on inspecting many dead bodies, I have always found some part or other of the stomach, and frequently the superior part of the duodenum in a gangrenous slate, and never without evident marks of injury from inflammation, let the disease have been of ever so short duration. These appearances are universally produced by a mortal yellow fever; but from the appearance of the liver, and gall-bladder, though both must be materially affected in this disease, there is no inference to be drawn that can be depended on." (Loc. cit. p. 414.)

Dr. Pinckard's observations accord with the preceding statement; he says "the appearances were not precisely such, as from converging with other practitioners, and reading a variety of authors, we had been led to expect. The stomach was found to be the organ which exhibited the strongest marks of derangement. The inner coat was furnished with blood, appearing very red, and at one front near the upper orifice it was of a livid hue, and its texture so weakened, that the finger was passed through it by only a slight pressure." (Loc. cit. vol. ii. p. 226.)

This author states in other parts of his book, that similar appearances were observed in other cases, which were examined by dissection. (Ibid. p. 322, &c.) Dr. Ruth, however, affirms, and from what we know of other fevers, we believe truly, that the morbid appearances of the internal parts of the body, as they appear by dissection after death, from the yellow fever, are different in different countries, and in the same countries in different years; as the same disease during different epidemic fevers affums very different aspects. From the observations of several physicians, quoted by Dr. Ruth, it appears that the liver and gall-bladder have been often disentangled in the yellow fever, marks of inflammation and gangrene, and a morbid colour and constancy of the bile, having been detected. The dissections of Dr. Mitchell, Dr. Mackiltrick, Dr. Phylyck, and others, coincide in the discovery of inflammatory disease in the stomach. "The stomach was inflamed both on its outside and inside;" says the first of these physicians, "its villous coat, like that of the duodenum, was covered with fuzzy and slimy matter." The second, after stating that the liver was differently affected in different cases, says "the stomach, the duodenum, and ileum were remarkably inflamed in all cases." The two last mentioned gentlemen remark, "that the stomach, and beginning of the duodenum, are the parts that appear most diseased," and inflammation of the villous membrane at the pyloric end of the stomach extending into

the duodenum, was the disease in some; extravasations of blood in others; the former in those who died early in disease, the latter in those who died at a more protracted period. In those cases in which the brain was examined by Dr. Mitchell, "it was not affected," and the two last-mentioned physicians affirm, "that the brain in all parts has been found in a natural condition." (See Dr. Ruth's Account of the Bilious Remitting Yellow Fever of Philadelphia, in 1793, 2d ed. pp. 114—122.) We may remark, by the way, that these facts are somewhat adverse to the doctrine of fever, lately promulgated by Dr. Clutterbuck, on which we have misadverted above, when treating of the doctrines respecting the nature of fever in general.

The yellow fever has been affected by some writers to be a new disease, the product of modern times, and even unknown till within a very recent period. We believe, however, with Dr. Mofley, Dr. Miller of New York, and others, that what is a modification of that disease which is familiar to Hippocrates, Aretzus, Galen, and other physicians of antiquity, the characteristic symptoms of which have been described by them, and the prognostic indications well pointed out. It is, in fact, the vesica cauful, and flavus ardens of the ancients, aggravated by the exceeding heat of climate. Hippocrates observes, in the ninth section of his book of Crises, "in burning fevers (the caufus), a yellowing of the skin appearing on the fifth day, and accompanied by hiccup, is a fatal symptom." The terrible symptom of black vomiting is also frequently mentioned by Hippocrates, and represented as being of fatal import. In the twelfth section of his prognostics, he afferts, that if the matter vomited be of a livid or black colour, it betokens ill. In the first section of his book of Crises, he enumerates black vomiting in a catalogue of the most fatal symptoms. And also in the fourth section of the same book, he considers porraceous, livid, or black vomitings, as indications of great malignancy. These maxims imply the similarity of their great author with those symptoms which are not known except as belonging to the yellow fever. (See a Paper by Dr. Miller of New York, in the Edinburgh Med. and Surg. Journal, for July, 1825.)

This destructive fever has never been known to appear, except either in tropical climates, or in those feasons, in the more temperate climates, in which the atmospheric heat has for some length of time been equal to the tropical heat, that is, at or above 80 of Fahrenheit's thermometer. This fact, Dr. Blane afferts, is incontrovertibly establised by observation; for there is no instance, either in North America or Europe, of the yellow fever appearing, except at those degrees of heat, nor of its surviving after the atmosphere had fallen to a lower degree of temperature. This is less to be wondered at in North America, where the winters are extremely severe, but it holds equally true at Cadiz, Malaga, Gibraltar, and other parts of Spain, where the winters are warm, and where this disease spontaneously disappeared, in degrees of heat equal to the usual summer heats in the north of Europe. (See Dr. Blane's Letter to Baron Jacob, respecting the Prevention of the Yellow Fever, in the Edinburgh Journal, for October, 1827.)

It seems to be well ascertained, then, that the yellow fever is an endemic of hot climates, or an epidemic of hot feasons in other climates; and this fact will enable us to explain the history of the disease, as well as to dispel our fears, that it may ever be brought to this country. By Dr. Mofley it is called the "endemiac caufus" of the West Indies.
It is a well known fact, that when Europeans first take up their residence in tropical climates, it is usual for them, sooner or later after their arrival, to undergo an attack of the endemic fever of the country. This fever of the visitors of the West Indies, in times of tranquillity, when the "new comers" are few, is termed a "feverising fever," but Dr. Pinckard observes, "in times of war, when, from great multitudes arriving at the same time, its destructive effects are more striking, it is baptized with the terrific name of yellow fever." This circumstance serves to explain the origin of the opinion that this fatal fever is the product of modern times; when the effulgum of colonial war has only multiplied the victims whom it might facilitate. (See Notes on the West Indies, vol. iii. p. 416 and 445.) The ordinary yellow fever seems to be justly considered by the most accurate observers as an aggravated form of the "bilious remitting fever," common to hot climates, especially where a particular condition of the soil, or some other source of effluvia, co-operates with the heat. The natives, or old residents in those situations, become habituated to the influence of these causes, and are less liable to be affected by this fever; and when they do suffer it, it is in a less severe degree. Creoles and negroes, Dr. Pinckard remarks, are not often affected with the disease, and are not subject to it in its continued or most malignant form, but when it does invade them, it more commonly assumes an intermittent or remittent type. Europeans, who have resided during a period of several years in the West Indies, have become in a great measure habituated to the climate, and have acquired a taste of constitution approaching to that of the natives; they are seldom attacked by the fever in its continued form; it commonly affects them in a remittent type. It is also exclusive in strangers, and in those from a northern climate, that the disease assumes the malignant and continued form. In North America, the inhabitants, who constantly reside in the most southern states, are seldom attacked with the fever in its more violent or continued form; while those of the north-east states are destroyed by it in great numbers. In a word, it appears that persons suffer the fever of hot climates in the different degrees of violence and severity of form, according as they are more or less feaoned or habituated to the temperature under which it occurs. Hence it has been properly fuggelled, that, in order to prepare our troops sent on service to the West Indies, they should be prepared for the climate gradually; for example, by first letting them serve for a time at Gibraltar, and afterwards employing them for a year or two in the more windward islands, as Barbados and Antigua, before they were sent to the other colonies.

Among the Europeans attacked with the ardent fever of the West Indies, the disease varies according to the state of the constitution. Thus the strong and plethoric, those of rigid fibre and rich blood, are the most liable to be attacked, and suffer the disease most violently and fatally. Hence, those who persevere in their accablled strong and stimulating diet suffer in like manner more severely than those whose vigour of habit is somewhat reduced by extreme temperature. It is observed that persons are most frequently attacked during or after exposure to great heat or fatigue, and to the night air, when it becomes cool and moist. Hence, on the one hand, those employed as cooks and blacksmiths are particularly liable to be feized, and lentilims, men occupied in fishing, and boat parties, on the other. We have before mentioned, when speaking of the caufes of fever, a fact related by Dr. Lind, that a boat's crew was three times destroyed and replaced, after going on shore for provisions in the night, the whole being as often seized with remitting fever, on the coast of Africa.

This endemic canus, like the remittents of northern climates, is more particularly prevalent in seasons when moist and marshy exhalations co operate with great heats, or cold and damp nights alternate with hot days. Hence, in more northern climates they have occurred only in the autumnal feasons, as at Cadiz in 1802, and at Malaga in 1803, and commonly at similar periods in New York and Philadelphia. After investigating the caufe of an exceflive prevalence of yellow fever in Demarara, in the month of July, Dr. Pinckard concluded that it was "probably the mere effect of the season, resulting from the increased heat of the days, the damp climate of the evenings, and the offensive malodours exhaled from half-spoiled mud."—"The quantity of rain that now falls is not sufficient to cover the feculent sediment of the numerous ditches, nor to prevent their unwholesome vapours from rising into the atmosphere; and the partial showers, which occur during the evening and night, by softening the dry-dried surface, favour the exhalation, while they produce a chilling dampness, which perhaps contributes to render the body more than ufally susceptibility of impression. The evenings are now so much colder to our feelings than we have found them during the preceding months, that we have lately been able to sit with the door shut, and have even thought that a blanket, during the night, might have been put on necessar." (Notes, vol. iii. p. 52.) Writing again from Demarara, in the ensuing month, (Augst), Dr. Pinckard says, "the present moment may be said to be the high feason of the yellow fever. It now rages in its utmost violence, and with every fever mark that great numbers perish from its malignity. Until the partial rains of the present period have ceased; and the dry feason will be well fitted, it is said that we are to expect a continuance of sicknefs, &c." (Ibid. p. 82.) In this respect the disease is altogether analogous to the autumnal remittents of our temperate climates, or of the warmer extratropical countries, when moisture succeeds or alternates with warmth, as we have already mentioned, when treating of the canus of fever. We have there seen that moist weather, after heat, generally produces a remittent fever, in countries where the soil is favourable to the formation of miasmas, and this is milder in its symptoms in the more northern and more violent in the southern degrees of latitude; thus it is an ague, or a remittent of moderate severity in England and Holland, but a fever and fatal ardent fever on the banks of the Nile and the Euphrates, after inundations have left the ground moist and sliny. On the shores of the Mediterranean, where Hippocrates practised, and frequently saw the yellow skin and black vomit of the ardent fever, Dr. Cleghorn found that the common tertian fever, when it attacked Englishmen, put on the usual symptoms of the yellow fever. (On the Difeases of Minorea. p. 176.) Dr. Rush, and other physicians of Philadelphia, and also those of New York, Dr. Miller, &c. are satisfied that the yellow fever, which has appeared in those cities in the autumnal seasons of hot years, originated in those cities, and was but an aggravation of the ordinary remittent fever. In Philadelphia the origin of the fever has been traced to the streets adjoining the docks and wharfs; in 1793, it was more particularly attributed to the putrification of a large quantity of damaged coffee, which was exposed in July on a wharf in the dock, in the vicinity of which the fever commenced. In New York, in 1825, Dr. Miller says, "on the whole, the low grounds on the margin of the waterfronts certainly produce a chief part of the calms." The different degrees,
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degrees, then, of fever originating from malaria, according to the heat of the climate or season in which they occur, appear to be in the following scale: 1. Common mild intermittent fever. 2. Common remitting, or bilious remitting fever, and; 3. The yellow fever. These seem to bear the same relation to each other, as, 1. The simple continued fever.

The contagious typhus, or gaol-fever; and, 3. The plague. (See Dr. Rush on the Fever of 1793, in Philadelphia, 3d edit. p. 178. Dr. Pinckard, loc. cit. vol. iii. p. 417. Dr. Miller, Report to the Governor of the State of New York, in the Edin. Med. and Surg. Journal, before quoted.) Dr. Miller puts the identity of the ordinary remitting fever and the yellow fever in a strong light; "as the materials of putrefaction, and the degrees of heat in a large city," he observes, "greatly exceed what is found in the adjacent country; so the disease acting under such circumstances must be proportionably more malignant. The pestilential fevers of our city differ only in grade from the bilious and remittent fevers of the country. They prevail in the same climates; they come on at the same season of the year; they are chiefly disposed to attack persons of the same constitution; they commit their ravages on the same organs of the body, and produce symptoms differing only in degree, and they decline and disappear at the same season, and under the same circumstances. In the city we often see in the same family, and under equal circumstances of exposure, the malignant forms of pestilence, and the mildest forms of remittent fever; and in the country, while the great miasms of cafus are usually mild, we occasionally meet with some, which exhibit the violent attack, the intense malignity, and the rapid dissolution, which more frequently mark the pestilential fevers of the city." The identity of the yellow and bilious remitting fevers is maintained, in equally strong terms, by Dr. Rush, and twelve other physicians, who presented a memorial to the governor of Pennsylvania on the subject. Their reasons for this opinion are the following: 1. The same fevers of their origin; both being the offspring of putrefaction. 2. The yellow fever makes its appearance in those months chiefly in which the bilious fever prevails, and is uniformly checked by the same causes, viz. heavy rains and frosts. 3. The symptoms of the bilious and yellow fever are the same in their nature. 4. The common bilious and yellow fever often run into each other; and the improper use of remedies will mutually convert them. 5. The common bilious and yellow fevers are alike contagious, under certain circumstances of the weather, &c. 6. They mutually propagate each other. 7. And, lastly, the yellow fever affects the typhus more than once, in common with the bilious fever. (Rush, loc. cit. vol. v. p. 45; &c.) These reasons are satisfactorily illustrated in some length.

Is the yellow fever contagious? It might appear rather extraordinary to the general reader, that the eye witnesses of so fatal a phenomenon should be at variance with respect to the existence or non-existence of contagion connected with it; yet it is not recollected, that a similar disagreement and diffusion have occurred with regard to the contagious nature of the plague itself, and more particularly among the physicians of the 16th and 17th centuries, who had the most frequent opportunities of witnessing its devellations. Some of the writers who contend for the identity of the yellow and remittent fevers deny the existence of contagion in both, while others maintain that these two fevers are essentially distinct, the latter being void of contagion, and the yellow fever being propagated by contagion only. Most of the West Indian physicians deny the contagion of yellow fever; while Dr. Chisholm, and several of the Americans, consider the disease as generally imported and extremely contagious. We commonly find truth between the extremes. It has been well understood at least since the time of Dr. Lind, that the effluvia of human bodies, even in health, when accumulated in close and crowded situations, become capable of exciting fever, or, in other words, become infectious; and that those which arise from the bodies of persons labouring under febrile diseases still more readily become infectious, and propagate the original disease, whether idiopathic fever, dysentery, erysipelas, &c. (See Contagion.) Upon these grounds, it would seem, Dr. Rufin and his colleagues maintain the occasional contagious influence of both the yellow and bilious remittent fever. "In a West India climate," he says, "where the accumulation of the effluvia from sick people is prevented by open doors and windows, it is easy to conceive this (yellow) fever cannot be often propagated by contagion. Even in our own country, (Pennsylvania) it has rarely been observed to be contagious in the months of July and August. But after cool weather renders it necessary to exclude the fresh air from sick rooms, it is easy to conceive the same effluvia may be so accumulated and concentrated, as to produce the disease in other people. In this way it was propagated in some instances during the year 1797, but by no means so often as in 1793, under equal circumstances." (Med. Inq. and Obs. vol. v. p. 37.)

The testimony of many other writers might be adduced, in corroboration of the fact, that yellow fever has been often propagated by contagion, especially under the circumstances just alluded to; we shall content ourselves with stating the following facts and observations. "Some late authors," says the veteran Dr. Wright, "who have written on West India diseases, have roundly asserted, that in tropical countries fevers are not contagious; but whoever has had the care of crowded hospitals, of gaols, of ships of war, or of transports full of troops, must have seen numerous and fatal instances of contagion in the West Indies; more especially where cleanliness and free ventilation have been neglected. From cauæs of this fort a most fatal and destructive disorder broke out in the West Indies in 1793, and soon after in Philadelphia, viz. the yellow fever. From Dr. Rush's book, and from the numerous letters of my correspondents, there remains not a doubt in my mind of the yellow fever being typhus, excited to a great degree of virulence from climate, situation, and other adventitious circumstances." (See Practical Observations on the Treatment of Acute Diseases, particularly those of the West Indies, by Wm. Wright, M.D., &c. in the Med. Facts and Obs. vol. viii. p. 6.) Dr. Chisholm has advanced some strong evidence to prove, that the malignant yellow fever, which Dr. Wright alludes to, was generated on board a ship on the coast of Africa (at Bulaama or Boulan), and the contagion imported to Grenada; whence it was afterwards carried to the other leeward islands, and to Philadelphia. We cannot here follow out the whole detail of circumstances as given by Dr. Chisholm; the following are some of the leading facts. The ship Hankey failed from England, laden with stores, and upwards of 200 adventurers, for the projected colony at Bulaam. The project failed, and they all lived on board during nine months on this coast. In the crowded vessel a malignant fever broke out, and destroyed three-fourths of the crew, leaving only the mate and two seamen to navigate the ship when she failed. Four men were put on board from ships of war at St. Jago to aid in navigating her to the West Indies. On the third day after leaving
leaving St. Jago, the men they procured from the ships of war were feized with the fever, and two of the four died; the remaining two were put on shore at Grenada and St. Vincent in a wretched state. No method was taken to purify or ventilate the ship, or the clothes, bedding, &c. From this period at which the Hangley arrived at Grenville, the 16th of February, to the commencement of the defructive yellow fever, the progress of which he describes in the following manner. A captain Remington was the first person who visited the Hangley after her arrival in St. George's Bay. He went on board the evening after she anchored, and remained three days, at the end of which time he left St. George's, and proceeded in a coasting vessel to Grenville bay, where his own ship lay. He was seized with the malignant fever on the passage; and the violence of the symptoms increased so rapidly, as on the third day to put an end to his existence. The crew of the Defence were the next who suffered by visiting this ship; the mate, boatswain, and four sailors went on board the day after her arrival; the mate remained either on deck or in the cabin, but the rest went below, and layed all night there. All of them were immediately seized with the fever, and died in three days. The mate was also taken ill, but, probably from his having been less exposed to the virulence of the infection, he recovered. The crew of the ship Bailleys, from the same imprudent civility or curiosity, were the next who suffered. These communicated the infection to the ships nearest them; and it gradually spread from those nearest the mouth of the Carenage, where the Hangley had for some time layed, to those at the bottom of it; not one escaping in succession, whatever means the captains took to prevent it. Had the disease arisen from the exhalations from the Lagoon, of the mangroves around that piece of water, it must have originated of course among the ships in the inner part of the harbour, Dr. Chilghom remarks, and its progress would have been onward towards the mouth of the Carenage, and not inward towards the bottom of the harbour. In the short space of time from the beginning of March to the end of May, 1790 of about 750 seamen, who manned the ships of the regular trade, died of this fever. About the middle of April the disease began to appear on shore. The first house in which it shewed itself was situated close to the wharf, and the infection was evidently introduced, Dr. C. says, by a negro wench, who took in sailors' clothes to wash; it extended to every individual of the family, a few negroes excepted. Among the troops, it first appeared in that part of the garrison quartered nearest to where the Hangley lay. One of the officers visited the ship, and with two or three soldiers who rowed his boat, remained on board some time. The consequence of this imprudence was fatal to himself almost immediately after; and in a little time to many of the men; the officers and men were successively feized, but it proved fatal only to recruits who had lately joined. (See an Essay on the Malignant Peltidial Fever, introduced into the West Indies by Boullon, on the coast of Guinea, as it appeared in 1793, 4, 5, and 6, inter- fered with observations and facts, tending to prove that the epidemic existing at Philadelphia, New York, &c. was the same fever introduced by infection from the West Indies islands, &c. by C. Chilghom, M.D., &c. vol. i.) How far the latter part of the statement in the title page is proved, we cannot pretend to decide.

Dr. Blane has stated a circumstance, very clearly shewing the propagation of yellow fever by contagion. "The prevalence of yellow fever being limited by a determinate range of atmospheric heat," he says, "and also by a certain degree of purity of air, many people of the belt under-
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See also Dr. Pinckard’s notes, &c. vol. ii. p. 238. Dr. Rush, loc. cit. p. 238. As those who have been daily occupied in the midst of the devastation of the yellow fever have disagreed as to the mode of its propagation, it is impossible to decide, at a distance, in what instances it was combined with contagion, or when it was the result of the seamen and maimates only. It would seem, however, that while the probability of infection arising in the close and crowded parts of a large city, when a fever is by any means introduced, is very great; the actual progress of the fever of Philadelphia, for instance, appears to favour the notion of an exciting contagion. (See Account of the Fever of Philadelphia, in 1793, by Matthew Carey.)

The violence and rapidity of the symptoms of yellow fever render the prostration extremely difficult and uncertain; no particular symptom affords any accurate prognostic; and it is only from attention to the general state of the patient, or the result of a combination of all the signs, that any idea of what the event may be is to be obtained. The state of the eyes, the change of voice, the general aspect of the countenance, and the degree of torpor or insensibility of the system, afford the most important information. Dr. Chircholm remarked, “that the longer the symptoms of the inflammatory ditheses continued, provided their violence was not progressive, the event became more favourable; and, on the contrary, that when the sudden disappearance of the fever was immediately succeeded by a seeming state of apyrexia, the worst symptoms, such as coma, delirium, chilly cold sweats, vibices, and death, might be soon expected. In the first case, the patient was gradually thrown into an agreeably warm and universal diaphoresis; irritability of stomach sealed; the eyes became more lively; and, in a little while after, the signs of returning health were evident.” (Chircholm, loc. cit. chap. v.)

Dr. Rush presents us with the following combinations of symptoms, as indicating a more or less favourable issue of the disease:

Signs of moderate danger.—1. A chilly fit accompanying the attack of the fever. The longer this chill continues, the more favourable. 2. The recurrence of chills every day or twice a day, or every other day, with the return of the exacerbations of the fever. A coldness of the whole at the above periods without chills, a coldness with a profuse sweat, cold perspiration, and hands with febrile heat in other parts of the body, and a profuse sweat without chills, or coldness, are all less favourable symptoms than a regular chilly fit, but they indicate less danger than their total absence during the course of their fever. 3. A purging of green or yellow bile on the first day of the disease is favourable. A discharge of black bile, if it occurs on the first day of the fever, is not unfavourable. 4. A discharge of green and yellow foids. It is more favourable if the foids are of a dark or black colour, and of a sted and acrid nature, on the first or second day of the fever. 5. A profuse and moist urine on the skin, in the beginning of the fever. 6. A feaue of pain in the head, or a sudden transfiguration of pain from internal to external parts of the body, particularly to the back. An increase of pain after bleeding. 7. A feverish. 8. A white or a yellow tongue. 9. An early disposition to spit freely, whether excited by nature, or the use of mercury. 10. Blood becoming fizes, as having exhibited the usual marks of great morbid action in the blood vessels. 11. Great and exquisitely sensitive in the fenfe of feeling coming on near the close of the fever.

Signs of great danger.—1. An attack of the fever, suddenly succeeding great terror, anger, or the intemperate use of venery. 2. The first paroxysm coming on without any premonitory symptoms, or a chilly fit. 3. A coldness over the whole body, without chills for two or three days. 4. A sleepiness on the first and second days of the fever. 5. Uncommon paleness of the face, not induced by bleeding. 6. Contiunt or violent vomiting without any discharge of bile. 7. Obdurate colicines, or a discharge of natural or white fluids. 8. A diarrhoea towards the close of the fever. 9. A suppuration of urine. It is most alarming when without pain. 10. A discharge of dark-coloured and bloody urine. 11. A cold, cool, dry, smooth, or shining skin. 12. The appearance of a yellow colour in the face on the first or second day of the fever. 13. The absence of pain, or a sudden cessation of it, with the common symptoms of great danger. 14. A disposition to faint upon a little motion, and fainting after losing but a few ounces of blood. 15. A watery, glairy, or brilliant eye. A red eye on the fourth or fifth day of the disease: it is more alarming if it become so after having been previously yellow. 16. Imperfect vision, and blindness in the eyes of the diffuse. 17. Deafness. 18. A preternatural appetite, more especially in the last stages of the fever. 19. A slow, intermittent, and shattered pulse. 20. Great rellingness, delirium, and long continued coma. 21. A discharge of coffee-colored or black bile from the stomach after the fourth day of the fever. (Ruth. Med. Ing. &c. vol. i. p. 129—133.)

The methods of cure adopted in the yellow fever have been very dilimiliar, and not very successful, on the whole. That the practice pursued in different countries, and in the same country at different times, must be dilimiliar, if judiciously chosen, cannot be doubted; for the same disease, when epidemic at different periods, and under different circumstances of climate, constitution of the people, feasons, &c. is wont to assume very different characters, and to demand a corresponding difference of treatment. It has been too much the practice with medical men to prescribe for the name of a disease, neglecting the varieties of type and character which it puts on; but it is sufficient to mention the modifications of small-pox and scarlet fever, to prove the error of such sweeping rules of treatment. Between the mild distinct small-pox, and the virulent confluent small-pox, there is hardly any analogy (in a practical view): and between the simple scarlet fever, which is scarcely a disease, if the busy hand of art does not interfere with it, and the pestilential scarlet fever with the malignant ulcerated sore throat, the practical difference is as wide as possible: yet they are the same disease, originating from the same poisons. In like manner, the yellow fever, when it occurs as a remittent among the natives or long inhabitants of hot climates; as a more severe remittent or continued fever, among the emigrants from northern latitudes, or the people of countries where a tropical degree of heat is only casual; or as combined with a typhoid contagion: in all these cases it assumes a form varied in point of severity and fatality; not to mention the varieties of the same form, according to the different epidemic constitution, as the phrase is, the cause of which we cannot explain. Thus, in one epidemic fever the inflammatory symptoms, or morbid excitement may run high; in another the succeeding failure of the vital powers may be more prevalent, &c. Perhaps a consideration of these circumstances, and of the different hypothetical notions which individuals adopt, may enable us to explain both the diffimilarity, and the general want of success, in the treatment of yellow fever, unless the cathartick and mercurial treatment may be excepted.

Two opposite modes of practice have been pursued in this fever: the one dictated by an opinion that the disease was luguely putrid, and the other that it was of a highly inflammatory nature. Other practitioners again have, to a certain
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A certain degree, combined these plans, instituting moderate evacuations in the first stage, as on the first or second day of the fever, and afterwars supporting the vital powers by bark, wine, laudanum, and aromatic tonics; not to mention the exhibition of mercury, so as to excite salivation, which others have employed. The practice suggested by the notion that yellow fever is of a highly putrid nature, viz. the use of bark, wine, and other cordials, from the moment the disease was seen, shall be brief, briefly noticed, and dismissed as a benevolent mode of treatment, which has been happily exploded by practitioners in general.

Dr. Chiholm remarks, that, "from the history of the disease it will not appear extraordinary that practitioners should have recourse to bark very early in it; and before they become sufficiently acquainted with its true nature and peculiarities. The suddenness of the changes, and the apparent sinking of the vital powers, a few hours after the accession of the fever, naturally incline us to consider it as a disease wherein tonics and antifeptics, with the whole tribe of cordials, could alone be useful. But no indication can be more fallacious than this; and innumerable instances occurred of the fatal consequences of adopting it. The use of the bark in the violent cases of the malignant pestilential fever, immediately after the operation of the evacuating medicines, was hurtful in the extreme, &c." (Loc. cit. vol. i. p. 365.)

Dr. Rush affirms, that, "had the whole materia medica been ransacked, there could not have been found any of these medicines more opposite to the disordered than bark, wine, and laudanum. In every case in which I preferred bark it was offensive to the stomach. Wine was nearly as disagreeable as the bark to the stomach, and equally hurtful. I tried it in every form, and of every quality, but without success: it was either rejected by the stomach, or produced in it a burning sensation. Laudanum has been called by Dr. Mofley "a fatal medicine" in the yellow fever.

In one of my patients, who took only fifteen drops of it, without my advice, to ease a pain in his bowels, it produced a delirium, and death in a few hours." (Med. Inq. and Obs. vol. iii. p. 298.)

At the commencement of the destructive epidemic of 1793 in Philadelphia, Dr. Rush used this plan fully, until his want of success compelled him to turn his attention to other measures. I had recourse to a gentle vomit of ipecacuanha on the first day of the fever, and to the usual remedies for exciting the action of the expectoration system: I gave bark in all its usual forms, of infusion, powder, and tincture. I joined wine, brandy, and aromatics with it. Finding them all ineffectual, I attempted to route the system by wrapping the whole body, agreeably to Dr. Hume's practice, in blankets dipped in warm vinegar. None of these remedies appeared to be of any service; for although three out of thirteen recovered of those to whom they were applied, yet I have reason to believe that they would have recovered much sooner, had the cure been trusted to nature." (Ibid. p. 193.)

Dr. Rush, having requested the advice of a West Indian physician, accidentally at Philadelphia, was recommended to add the cold affusion to the large administration of bark; but the bark was offensive to the stomach, or rejected by it in every instance. The affusion of buckets full of cold water frequently upon the sick was grateful, and produced relief in all cases, by inducing a moister on the skin. But three out of four of the patients thus treated died: some physicians lost all their patients, and whole families were swept off, where these medicines were used.

In a word, this early use of stimulant medicines is in this, as we believe in all other fevers, decidedly prejudicial. And, although season and climate vary all diseases, we are disposed to apply still more generally Dr. Rush's observation, when he says, "without fear of being refuted, I will notwithstanding assert, that the proper remedies for this fever, at all times, and in all places, in its first stage, must be evacuations." (Ibid. p. 335.)

The succues which Dr. Rush, and many others upon his suggestion, experienced by commencing the cure by evacuations, especially purging, was remarkable; and we cannot but enter into the heartfelt gratification of this distinguished physician, when, in the forlorn state of ignorance as to the means of allaying the distresses of his fellow citizens, in the commencement of a raging pestilence of unparalleled fatality in that city, he was accidentally directed to an useful remedy; and in his note-book of the 15th of September wrote the following: "Thank God! out of one hundred patients whom I have visited, or preferred for this day, I have lost none." This remedy consisted of a combination of calomel and jalap, employed as a speedy purgative, in the dose of ten grains of the former with fifteen of the latter: "even this dose was low and uncertain in its operation. I then increased three doses, each consisting of fifteen grains of jalap and ten of calomel; one to be given every five hours until they procured a certain evacuation. The effects of this powder not only answered, but far exceeded my expectations. It perfectly cured four out of the first five patients to whom I gave it, notwithstanding some of them were advanced several days in the disorder." (Ibid. p. 241.)

The succues of this remedy was communicated to the College of Physicians, and the plan was immediately adopted by several physicians with a great and decided superiority over all other means hitherto employed. Large families were altogether recovered by it. From this moment Dr. Rush gained a great accession of patients, and the demand for the purging powders became greater than could be easily supplied. Together with this evacuation, Dr. Rush employed other means of abating the excords of fluxus from the sytem: these were blood-letting, cool air, cool drinks, low diet, and applications of cold water to the body. By these measures Dr. Rush publicly ascertained that a greater proportion than ninety-nine out of a hundred of all who applied to him on the first day of the disorder, before the 17th day of September, were cured. And others were in a similar manner successful. "Dr. Pennington assured me," he says, "on his death bed, that he had not lost one out of forty-eight patients whom he had treated agreeably to the principles and practice I had recommended." Dr. Griffiths triumphed over the disease in every part of the city, by the use of what were called the new remedies. My former pupils spread, by their success, the reputation of purging and bleeding wherever they were called. Not only is the general success of this plan of treatment thus shown; but it is farther evinced by the great confidence which was excited in it. "Twenty men," says Dr. Rush, "employed constantly in putting up this medicine, would not have been sufficient to have complied with all the demands which were made on me for it. Hundreds who were in health called or sent for it, as well as the sick, in order to have it in readiness, in case they should be surprised by the disorder in the night, or at a distance from a physician."
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With respect to the propriety of clearing the bowels at the commencement of typhus fever, by cathartics, the most experienced and intelligent practitioners agree, although they differ as to the extent to which this evacuation should be carried. Dr. Hillary is satisfied with the use of a syrup, or very gentle laxative; and Dr. Chisholm is of opinion, that it is never necessary to excite a larger discharge by physic than is barely sufficient to remove the acrid and offensive humours from the bowels; and from the wonderful aptitude of the persifls of the sick, in the malignant pestilential fever, to sink into an irrecoverable state of debility, under alvine evacuation carried beyond this, I have considered it unjustifiable, in every respect, to adopt such practice. It is probable, indeed, that the nature of the epidemic in the West Indies was such as to bear severe evacuation, even in its commencement, with less safety than the epidemic of Philadelphia. Some practitioners in the West Indies I find, says Dr. Chisholm, have adopted the plan of Dr. Rush, but by no means with the wonderful success he has attributed to it. The hope is, however, that too many proofs of its disastrous consequences in a hot climate. In the year 1796, at Port Royal, where the malignant pestilential fever was epidemic, many of the practitioners gave calomel and jalap in the manner recommended by Dr. Rush, and consequently excited a most profuse discharge. The event was, however, very different from the statement of Dr. Rush; for the mortality among the inhabitants was very great; some ships were entirely flipp'd of their crews, and many lost more than half. I am well assured, that five out of six perished on this occasion of the whole seafaring with this dreadful malady. A hyperaesthesia was induced, under which the sick immediately funk." (Vol. i. p. 169.) Although the plan, which was successful in North America, might be too violent within the tropics, when carried to the same extent, it would seem, however, that the principal was usefully applied, and that Dr. Chisholm himself, notwithstanding his favourite object of exciting mercurial action in the fyltem, adopted the principle in a great measure. His first practice was confined to clearing the bowels by purgatives and antimony; on the re-appearance of the disease, in 1794, he gave calomel alone, repeating it till the intestinal canal was cleared of its contents; and he afterwards increased its activity by the addition of jalap, or any other purgative medicine of quick operative effect. "The great rule, in short," he affirms, "is to empty the intestinal canal as speedily and as completely as possible, so as to prepare it for the reception and absorption of mercury." Whatever be the mode of reposing on the subject, it is obvious that, in point of fact, this practice is essentially the same, except in degree and extent, with that of Dr. Rush; and we may therefore conclude, that purging, in the attack of yellow fever, has been found the most efficient remedy that has hitherto been employed.

Dr. Chisholm, however, administers the calomel with a view to its influence on the constitution as a mercurial, not merely as an evacuant; but it is obvious that, in the quantity in which he employs it, it must produce considerable evacuation in general. "My mode of using the calomel," he says, "after the re-appearance of the malignant pestilential fever in 1794, was to give ten grains, either alone, or with an equal or a double quantity of jalap, to an adult patient as soon as possible after I saw him. This generally acts as an evacuant in the degree required, about an hour or two after it is given. At the end of three hours I repeated the dose of calomel. At the end of three hours more, the same quantity is given, adding opium or not, as the preceding doses have acted. In this manner ten grains of calomel were given every three hours, till the bowels became made, which generally happened in less than twenty-four hours from the commencement of the treatment, if it was faithfully conducted. The effect of the medicine, given in this manner, may be perceived after the third dose in general; the patient becoming calmer, less restless, less anxious; his skin being softer, and protected of an agreeable heat; the bowels being perfectly retentive, however irritable it might have been before; and the eyes recovering their former lucidity and sensibility. When at length salivation takes place, the patient is left free from distress, with a moderate warm moisture on his skin; and very soon after signs of returning health are indicated by calls for food, &c. The recovery of strength is proportionally rapid to that from distress; nor is it at all necessary to have recourse to bark, or any other medicine whatever; a circumstance truly gratifying both to the patient and the physicians, in a disease wherein nature revolts at the very idea of it. There are circumstances, however," Dr. Chisholm candidly adds, "in which the utmost difficulty is experienced in obtaining this effect from calomel; and others in which the candid practitioner must acknowledge its insufficiency." (Loc. cit. vol. i. p. 252.)

Dr. Chisholm declares, that the success attending this practice exceeded his most sanguine expectation: "To great, indeed, was it, that I did not lose a single patient in whose case it was pushed to the full extent:" (ibid. p. 352.)

In the frequent occurrences of the epidemic in Philadelphia, Dr. Rush employed the mercurial remedies, to as to produce salivation, with great advantage. He endeavoured to excite it early in all those cases which did not yield immediately to bleeding and purging. "I was delighted," he says, "in the success in many cases which I used it. These effects were as follows: 1. It immediately attracted and concentrated in the mouth all the scattered pains of every part of the body. 2. It checked a nausea and vomiting. 3. It gradually, when it was copious, reduced the pulse, and thereby prevented the necessity of further bleeding or purging. I wish it were possible to render the use of this remedy universal in the treatment of malignant fevers. It is a rare occurrence for a patient, that has been sufficiently bled and purged, to die after a salivation takes place." "I lost but two patients in our late epidemic in whom the mercury excited a salivation. One of them died from the want of nursing; the other by the late application of the remedy." (See Rush's Medical Inquiries and Observations, vol. iv. p. 93, and vol. v. p. 117.)

The good effects of purging and of salivation, speedily excited in the yellow fever, appear, then, to rest upon strong evidence; for besides their personal experience, both Dr. Rush and Dr. Chisholm have adduced the testimony of several other practitioners, in whose hands the administration of these remedies was attended with a similar success.

The evidence, with respect to the advantages of blood-letting, is somewhat more contradictory: Dr. Rush, and several other physicians of Philadelphia, conjointly bleeding with the purging plan, and their successes are said to have been generally great. Dr. Rush affirms that "blood-letting, when used early on the first day, frequently deftroyed the disease in its birth, and generally rendered it more light, and the convalescence more speedy and perfect." But he admits that where it "had been omitted for three days, in acute cases, it was seldom useful," nay, he even says, "I am not sure that it ever shortened the duration of the
the fever, where it was not used within a few hours from the time of its attack." (Med. Inq. and Obf. vol. iii. p. 266 & 7.) Yet he mentions numerous instances in which the benefit was most decided, and has described at length the obvious advantages which generally resulted from it. He does not however recommend it indiscriminately; the repetition of the operation, and the quantity of the blood to be drawn, must be regulated by the observation of the physician. Dr. Chitholm considered the evacuation as invariably pernicious in the yellow fever of the West Indies in his first publication. In his second, he says, "with a trifling modification, it is the opinion I now hold, after again facing the disease, and after becoming acquainted with the sentiments on it of the most judicious West India practitioners, I am satisfied, that when it is possible to see the sick in this disease at the period of its accession; that when there are young robust men, immediately from England, or any other country pos- sessing a similar climate; that when the temperature of the weather is such as seems most to favour the propagation of the disease; and that, when the predisposing causes have been such as have a tendency to accelerate the motion of the fluids and to give rise to other unequivocal signs of an inflammatory disposition; then one plentiful bleeding may, undoubtedly, be of infinite service. But when most of these circumstances are absent; and when, consequently, no just indication for the employment of this remedy can be formed, I consider the use of it as a wanton abuse of confidence, and as inevitable destruction to the patient. This observation may be extended to the yellow remittent fever without limitation; for in it the means of unqualified depletion are fully as pernicious as those of repletion, or those which serve to maintain or augment the vigour and tone of the body." He attributes the freedom of Dr. Rush's practice to the difference of climate, the greater ten- dency to local inflammations, and the other circumstances above mentioned. The testimony of Dr. Jackson, Dr. Mofley, Dr. Pinckard, and others, tends to prove the salutary effects of early bleeding, even in the yellow fever of the West Indies. (See Dr. Robert Jackson on the Fevers of Jamaica, Drs. Mofley and Pinckard, as before quoted.) It cannot be questioned, however, that, generally speaking, this remedy is principally beneficial at the very oniet of the disease; and that when its vigour is abating the practice must be disadvantageous, and accelerate the malig- nant symptoms. Dr. Rush admits, that even an active pur- gative, given after the fifth day, has been hurtful.

On the whole, it seems to be demonstrable, that the treatment of the yellow fever has been most successfuly conducted upon the principles which we have laid down for the cure of fever in general; namely, by a steady sflem of withdrawing all stimuli, internal and external, at the com- menecement, i.e. by the antiphlogistic plan, purged with a vigour proportionate to the violence and fatality of the disease; and that stimulants and cachetics are pernicious, if given early, and nearly unnecessary at the later periods, where the proper evacuations have been adopted in the beginning.

For the same reason which suggests the propriety of diminishing internal stimuli by evacuations, the diet must be light and liquid, and the drink cold and diluent. All solid animal food is to be forbidden for many days after the entire cure of the fever; as the indulgence of the appetite too suddenly in that way is the cause of numerous relapses. A weak vegetable diet, with fruits, should be strictly adhered to. The drink should be thin and diluent; such as cold water, toat and water, lemonade, tamarind or raw apple- water, or weak balm and camomile tea, where the Romach is affected with sickness. The subacid drinks were prefer- red in most cases. Dr. Rush says, as being not only most agreeable to the taste, but because they tended to correct, by mixture, the acid qualities of the bile. All these drinks may be taken in the early stage of the disorder. In the convulsive stage of the fever, and in such of its remissions, or intermissions, as are accompanied by great languor in the pulse, wine whey, porter and water, and brandy and water, may be taken with advantage.

Upon the same principle of withdrawing stimuli and irritation, cool fresh air, and cleanliness, are very beneficial. Cool air is equally proper. Dr. Rush observes, whether the arterial system is depressed, or whether it showed in the pulse a high degree of morbid excitement; and is only in- proper where a chills attends the disease. Cold bathing, or affusion of cold water upon the skin in the hot stage of the yellow fever, has been found extremely beneficial; Dr. Rush found its employment advantageous under the same circumstances as Dr. Currie recommended it. (See Cold, and Fever above.) Dr. Chitholm and Dr. Jackson affirm that the cold affusion is most effectually used in a manner somewhat similar to the practice of the American Indians, and of the Russians, viz. by a succession of alternate warm and cold bathing. The patient being first immersed in a warm bath, and then removed, while the sen- sation of the heat is still upon him, a bucket of cold water is thrown over his naked body. Dr. Jackson recommends this practice after evacuation by blood-letting has been em- ployed, and Dr. Chitholm affirms that evacuating medicines are advantageously used at the same time. The local ap- plications of cold have been often very successful in remov- ing local symptoms, such as head-ache, delirium, irritability of stomatch, &c. Cold water, or a solution of salts, such as the muriate of ammonia, or of soda, applied by means of cloths repeatedly soaked in them to the head, and pit of the stomatch, have often quelled excessive action in those parts, and thus afforded material relief. Cold water injected into the bowels by way of clyster has produced similar results; and bathing the feet in cold water has frequently had the agreeable effect of relieving the head, the oppression at the precordia, and the general heat. Dr. Rush affirms that cold water thus applied to the feet very certainly diminishes the frequency of the pulse, and mentions an experiment, in which the pulse, in the course of a few minutes, was reduced 24 strokes, and became too weak as hardly to be perceptible.

With regard to the employment of blisters in the yellow fever there is the same contradiction of sentiment, as to their use, among the physicians of our climate in fevers in general. Dr. Chitholm, both upon his own observation and the testi- mony of others, affirms that blisters were never of any use, at any period of the disease, or to whatever part of the body they were applied, not even in relieving head-ache, or other local symptoms; while Dr. Rush, like Dr. Lind, considers them of great service, when applied to any part of the body, but particularly to the crown of the head. In his subsequent publications, however, he expresses himself rather less favourably of their utility, and limits their good effects to a particular juncture, which he calls the blissing point, and which, in bilious fevers, he says, is generally con- summated within eight and forty hours; for "when ap- plied in a state of great arterial action, they do harm; when applied after that action has nearly ceased, they do little or no service." (See Med. Inq. and Obf. vol. iii. p. 291. iv. 9.; and v. 122.) We are very sceptical as to the operation of blisters in fever, except in relieving local congestion.

After the reduction of the morbid action of the blood- volan.
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vessels, by means of the remedies which have been mentioned, no other tonic is necessary than a nourishing and gently stimulating diet, and change of air. The best authors coincide in stating that, contrary to what occurs in most febrile diseases, bark and wine were not only useless or absolutely hurtful, but were generally loathed and rejected by the convalescents. The diet which is generally most agreeable to the palate, as well as the lightest and most nourishing, consists of fag, pandu, and arrow root, prepared with Madeira wine, and spice, with ellers, eggs, and malt liquors, which the patients relish greatly. The convalescence from the yellow fever is generally rapid, but in some cases it is very slow. As long as the patient remained in the infected room or house, Dr. Chisholm remarks, although the symptoms of the disease had disappeared, the progress of his recovery was relatively slow, and more especially when bark had been employed in the treatment, without the previous use of debitters, and the appropriate antiphlogistic. A change of air and situation became advisable from the moment that signs of convalescence appeared; and the purer the atmosphere, and the more elevated the situation to which the patient was removed, the more rapid was his acquisition of strength.

Prevention of Yellow Fever.—As those persons, who were in the highest strength and vigour of health, and who were not relaxed and enfeebled by long residence in hot climates, or by a low diet, were the most frequently attacked by the yellow fever, when it was epidemic, both in the West Indies and in America; so a system of diet and regimen, which was conducive to a diminution of plethoric, was the most effectual means of preventing individuals from being attacked by the disease. Dr. Rush recommended his fellow citizens to reduce their diet during the prevalence of the epidemic. He lived sparingly himself upon tea, coffee, milk, and common vegetables; but his favourite drink was a mixture of milk and rum, with a small quantity of linseed meal and camphor. His drinks were milk and water, weak claret and water, and weak porter and water. "I sheltered myself," he says, "as much as possible from the rays of the sun, and from the action of the evening air, and accommodated my dress to the changes in the temperature of the atmosphere. By similar means, I have reason to believe many hundreds escaped the disease who were constantly exposed to it. There appears to be no connection of climate and maladies that can reftit the good effects of abstinence or depickting medicines, in preventing or moderating an attack of this fever," (Med. Inq. and Ofe. vol. v. p. 39.) He recommended also to the people, besides a diet of milk and vegetables, cooling purges to be taken once or twice a week, and moderate blood-letting to all such as were of a plethoric habit; and he advised them to avoid heat, cold, labour, and every thing else that could excite the contagion (which he knew to be present in all their habitations) into action. (Ibid, vol. iii. p. 295—297.) The advice of Colfin, during the prevalence of pestilence, is very comprehensive: "Vite fatigationem, eructationes, feces, diuretes, calorem, lumbalem, multoque magis esse contigit." But it is a mortifying consideration, Dr. Chisholm remarks, that few of our countrymen can be prevailed upon to submit to the deprivation of any gratification, which, if within their ability to purchase, is very generally and very pertinaciously refused to. The comparative security from, and less mortality of, the yellow fever in the French and Spanish than in the English islands in the West Indies, have been justly attributed to the more temperate habit of the people. When the pestilential fever raged at Grenada, Dr. Chisholm observes that the French inhabitants remained almost totally exempt from it. Among them, animal food and strong liquors were very moderately used; their diet being chiefly composed of vegetables, and small acid red wine. The same author, indeed, remarks, "during the prevalence of pestilence, I am inclined to think, from a variety of facts, that abstinence from every species of strong liquor, wine itself not excepted, is more conducive to the maintenance of health, than any other dietetic regulation whatever. It is an established fact that water-drinkers either escape the malignant pestilential fever altogether, or had the disease in a remarkably mild degree. On the other hand, many instances occurred of free drinkers receiving the infection in the morning, and having the attack of the fever after a plentiful repast of animal food and wine in the following night." (Ibid. vol. ii. p. 491.) In short, the fact, that extreme temperance, and even evacuations in those that are plethorics, when in hot climates, is the most certain to escape the disease peculiar to those countries, and especially the yellow fever, is now ascertained beyond all question. Dr. Moxley says, "the English drink more wine and spirits than the French; the French more than the Spaniards; and we calculate the mortality of it by this rule. The Spaniards live to great ages in the plains of St. Jacques, &c. in St. Domingo, partly from the slowness of the air, but chiefly from their sobrietie." (On Tropical Difeases, p. 53.) And he affirms, that, while the inflammatory diathesis of the body remains, (as it will with some people, who migrate to hot climates, for many years,) "those who use water for their common drink, will never be subject to troublesome or dangerous diseases." (Ibid. p. 57.)

The question relative to the contagious or non-contagious nature of the yellow fever, above noticed, is not a matter of mere curiosity and speculation, but of the greatest practical importance, with a view both to domestic and to public life. The means to be adopted for the prevention of the spreading of the epidemic must necessarily be very different, if it arise from imported contagion, and if it be of domestic origin. Those means which afford security in either case must be useless, and therefore virtually detrimental in the other. Should the fever be the result of imported contagion in its origin, the usual methods of quarantine, and fumigation, &c. of goods, ships, and persons, must be resorted to. (See Contagion, Plague, and Quarantine.) But the best writers attribute the yellow fever to the misjudgment and puritil exhalations from various domestic sources; and we have understood that by diminishing those sources of the pestilence, Philadelphia has been much less subject to its occurrence in the usual feason. In the memoir of the thirteen physicians above alluded to, the governor of Pennsylvania is informed, and the information is supported by accompanying documents, that the epidemic fever was derived from the following circumstances, which are stated more in detail by Dr. Caldwell. There are, 1. Puritil exhalations from the docks and wharfs, the streets, fewers, gutters, cellars, privies, dirty yards and alleys, ponds, and collections of filth in the neighbourhood of the city; and also 2. The foul and noxious air emitted from the holds of ships. Of the origin of these fevers from the puritil exhalations, arising within and around Philadelphia, Dr. Caldwell and others have stated much evidence; (See Med. & Phil. Memoirs, containing, among other subjects, a particular inquiry into the Origin and Nature of the late Pestilential Epidemics of the United States. By C. Caldwell, M. D. Philadelphia, 1801.) and the correctness of attributing the origin of these fevers to such causes, is further strengthened by our knowledge of the connection of remittent and pestilential fevers in London,
con, and the other large cities of Europe, in similar feasons, with a sffthy condition of the streets and houses, and a bad arrangement of the sewers, gutters, &c. See Epidemic. (See also Dr. Heberden, jun. on the Incresse and Decrease of Dit. Lond. 1801, and the Annual Med. Regifter, vol. i. for 1828.) With respect to the second source of fevers, viz. the foul air of ships, Dr. Ruth has adduced some strong evidence of its occurrence in ships, containing especially vegetable matters in a state of putrefaction. In 1797 the yellow fever first appeared on board a veifil at one of the wharfs, and in the neighbourhood, affecting a great number of persons at the fame time: this ship had in her hold a quantity of prunes, almonds, olives, capers, &c., in a putrid state, and emitted a most offensive smell, after which vessel had discharged her cargo, which was perceived by persons several hundred yards from the wharf where she was moored. At Tortuga, Dr. Ruth states, a fever was produced, in June 1787, from noxious air generated from a few barrels of potatoes, which destroyed the captain, mate, and most of the crew in a few days. Some rattled bags of pepper on board a French Indian man produced the yellow fever, in June 1793, at Bridgetown: "all the white men, and most of the negroes, employed in removing this pepper, perished with the yellow fever, and the foul atmosphere affected the town," where it proved fatal to many of the inhabitants. Several other facts, of a similar nature, are mentioned, and Dr. Ruth adds, that this flush of yellow fever in warm climates is far too well known, and it is generally admitted, that Dr. Shannon, a late writer, in enumerating its various caufes, expressly mentions it as the putrid effuVia of a ship's hold." These facts not only lead to the certain means of preventing one of the sources of the yellow fever, but serve to explain the reasons why sailors are so often its first victims, and why, from this circumstance, the origin of the disease has been so habitually ascribed solely to importation.

Under these impressions as to the origin of the yellow fever, Dr. Ruth, Dr. Caldwell, and the others who addressed the governor of Pennsylvania, recommended the following means of prevention. 1. A continence of the laws for preventing the importation of the diseafe of the West Indies, and other parts of the world where it usually prevails. 2. A removal of all noxious matters from the streets, gutters, cellars, gardeus, yards, foles, vaults, pouds, &c. which, by putrefaction in warm weather, afford the most frequent remote cause of the disease in America. 3. "We most earnestly recommend the frequent washing of all impure parts of the city in warm and dry weather; a measure which we conceive promises to our citizens the most durable exemption from similar fevers of all kinds, of domestic origin. 4. To guard against the frequent source of yellow fever from the noxious air of the holds of ships, we recommend the unloading all ships, with cargoes liable to putrefaction, at a distance from the city, during the months of June, July, August, September, and October. To prevent the generation of noxious air in the ships, we conceive every vessel should be obliged by law to carry and use a ventilator, &c." They add, "It has been by adopting measures, similar to those we have delivered for preventing pestifential diseases, that most of the cities in Europe, which are situated in warm latitudes, have become healthy in warm feasons, and amidst the closest commercial intercourse with nations and islands, constantly afflicted with those diseases. The extraordinary cleanliness of the Hollanders was originally imposed upon them, by the frequency of pestifential fevers in their cities. This habit of cleanliness has continued to characterize those people, after the cauies which produced it have probably ceased to be known." (Ruth, Med. Inq. & Obf. vol. v. p. 54, &c. 1807. Caldwell, loc. cit. Chifholm, vol. ii. chap. 1.)

Besides the denominations of fever above explained, several others are to be found, especially among the older medical writers, which, however, require no notice here, as they are improperly applied, and are not used at present. Such are arthritic, ophthalmic, typhus, bilious, febrifus, fever, &c. See Arthritis, Asthma, Hysteria, &c.

Fever wards, Fever-houfes, or Fever-dispens, wards or houses fit apart for the reception of typhus, or contagious fever, are likewise established.

The country is indebted to Dr. Haygarth, formerly of Chitter, now of Bath, (1809,) for the foundation of these admirable institutions. It had been observed by Dr. Lind of the Hallar hospital, that the infectious distance of common contagious fever was small; or, in other words, that the effluvia from the bodies of persons labouring under typhus were incapable of infecting those in health, at a greater distance than a few feet, and that in a pure atmosphere, or well ventilated room, the effluvia were so much diluted and weakened, as to be no longer capable of communicating the disease. Hence the inference, which Dr. Haygarth proved by the test of experiment, that by separating those persons, labouring and contagious fever, from others in the same hospital, or by appropriating wards to this disease, the contagion might be prevented from spreading in the crowded receptacles of the sick; and fecondly, that by having each wards, or separate hospitals, for the reception of fever, constantly open for the admittance of patients, especially in crowded towns, or in epidemic feasons, whole families might be at once recovered from the contagion by the removal of the first person infected into them; and that thus the contagion of typhus might be exterminated. Upon this principle, such fever-wards were erected in the hospital at Chitter, and in that of Liverpool, and as frequently separate hospitals have been established in many of the large towns in England and Ireland; first at Manchester, then at Cork, Waterford, Dublin, Leeds, London, &c. These were happily named, we believe by Dr. Ferrar of Manchester, "Houfes of Recovery;" a denomination conveying the fignification of the word, and that by which they are now generally designated. These Institutions are not only calculated to preserve the crowded population of large towns from the fatal effects of epidemic fever, but to diffuse the maxims of cleanliness and ventilation, which are inculcated in the habits of the poor, whence patients are removed; and also to dispel those false and pernicious notions, respecting the general diffusion of contagion in the air, which are too widely prevalent even among the unlearned part, i.e. the majority of the profession, who, by the aid of the principal upon which these institutions have been founded, as well as the successful result of their practice, and the regulations under which they are conducted. (See also Contagion.) Haygarth on the small-pox, and his Letter to Dr. Pecial respeaking the suppression of contagion. — An excellent Collection of Papers on the subject of a similar establishment at Newcastle. Also Dr. Ferrar's Med. Histories and Reflections. The Reports of the Houfe of Recovery at Dublin, Cork, London, &c.

Fever, in the Veterinary Science, is a disorder to which horses are very subject from a variety of causes. The symptoms which denote the horse to be afflicted with a fever are very red eyes, by reason of which he ranges from one
end of the rack to another, beating of the flanks, redness and inflammation of the eyes; a parched and dry tongue; his breath is hot, and of a burning freck; heoles his appetite, and nibles his hay without chewing it, and frequently flinches to the ground; he dung often, but little at a time; and his dung is usually hard, and in small pieces; he sometimes flares with difficulty, and his urine is highly coloured; he is always craving for water, and drinks often, but little at a time; and his pulle beats full and hard, fifty strokes and more in a minute. The first part of the case is bleeding; and the quantity, if the horse is strong and in good condition, should be two or three quarts; then give him four times a day a pint of the following infusion: take, baum, fage, and camomile flowers, each a handful; an ounce of liquorice root, sliced; and, three ounces of nitre; and pour on these ingredients two quarts of boiling water; when cold, strain it off, and squeeze into it the juice of two or three lemons, and sweeten it with honey; or an ounce of nitre mixed into a ball with honey may be given thrice a day instead of the drink, and washed down with any small liquor. The horse’s diet should be scalded bran in small quantities, or dry bran sprinkled with water, or a handful of picked hay may be put into his muck. His water should be a little warmed, and given to him often and in small quantities; his covering should be moderate. If the horse refuses to feed, in a day or two more blood should be taken away, and the drinks continued, to which may be added two or three drams of affiron. If his dung continues hard and knotty, a cypher may be given, prepared by boiling two handfuls of marshmallows, one of camomile flowers, and an ounce of fennel feed, in three quarts of water; fill it to reduce to two, and adding to the strained liquor four ounces of treacle and a pint of linseed oil or any common oil. This cypher should be repeated every other day; and on the intermediate day the following drink may be given: take of cream of tartar and of Glaner’s salts, of each four ounces; dilute them in barley-water, and add an ounce or two of lenitive, diet, or a dram or two of powder of japh. By pursuing this treatment the horse will begin to recover; and nothing more will be found necessary than to give him gentle exercise in the air, and plenty of clean and fresh air. All fever to which horses are subject, more dangerous than the former: this is a low fever attended with great depression; the horse is sometimes inwardly hot and outwardly cold, and at other times hot all over: his eyes appear moist and languid; his mouth is continually moist, so that he has no inclination to drink, and he is satisfied with very little. He eats little, moves his jaws in a feeble loofe manner, and grates his teeth; his body is commonly open, his dung loof and moist; his flaking irregular, sometimes little, and at other times profuse, and his urine pale, with little or no sediment. These fevers are attended with a running at the nose, and the matter discharged is of a reddish or greenish dusky colour, and of a conhuent like glue. About three pints of blood should be first taken away, and bleeding repeated according to the strength and fulness of the horse, the degree of his cough, or any tendency to inflammation. After this the nitre drink already prescribed may be given, with the addition of an ounce of snakeroot, and three drams of affiron and camphor dissolved in a little spirit of wine. The horse’s diet should be fedded or sprinkled bran, and the best hay, with which he should be fed by hand, as he sometimes cannot lift up his head to the rack. Drinking plentifully will greatly contribute to dilute the blood; but if the fever should increase, balls of contrayerva root, myrrh, and snake-root, powdered, of each two drams; affiron, one dram; mithridate or Venice treacle, half an ounce, mixed with honey, should be immediately given twice or thrice a day, with two or three hours of infusion of snake root sweetened with honey; to a pint and a half of which may be added half a pint of treacle water or vinegar; if these fail produce no sensible effect, let a dram of camphor or calomel be added to each of them; or the following drink may be substituted in their stead for some days: take a dram of camphor dissolved in one ounce of rectified spirit of wine; then gradually pour on a pint of diluted vinegar warmed, and give it at two doses. If the horse should be coltive, recourse must be had to emulsions or the opening drink; and if he purge to a considerable degree, diazordium may be added to his drinks instead of the mithridate. The operation of medicines in this disease is much promoted by plentiful drinking; the horse’s faeces should be restrained when it is considerable and weakening, by proper astringents, or by mixing hine-water with his drinks; and when he is remits in this respect, and faeces do little as to occasion a feeling of his body and legs, two or three of the following balls may be given at intervals, with a decoction of marshmallows sweetened with honey: take of sal prunella or nitre, one ounce; juniper-berries and Venice turpentine, of each half an ounce; and make these ingredients into a ball with oil of amber. If with this treatment the horse’s skin feels kindly, his ears and feet are moderately warm, his eyes brisk and lively, his nose becomes clean and dry, his appetite increaseth, he lies down well, and faeces and dungs regularly, there is a fair prospect of a speedy recovery; but he should be fed sparingly, and his diet should be light, and increased by degrees as he gains strength. If the fever should interrupt, give an ounce of Jesuit’s bark in the interval of the fits, and repeat it every six hours till the horse has taken four or fix ounces. (Bartlet’s Farrier’s Dictionary.)

Mr. White, in his “Compendium of the Veterinary Art,” distinguishes only two kinds of fever, the one, an idiopathic or original disease, and termed simple; the other dependent upon external inflammation, and usually denominated fever, or inflammatory fever. The former does not occur so frequently as the latter, nor is it by any means so formidable in its appearance. The symptoms are obvious, succeeded by loss of appetite, dispeased appearance, quick pulse, hot mouth, and some degree of debility; the horse is generally coticile, and voids his urine with difficulty. The disease is also often accompanied with quickness of breathing, and in a few cases with pain in the bowels, or symptoms of colic. As soon as a horse is attacked with this disease, Mr. White advices, that he should be tied freely; and in case of colicines, to give a pint of castor oil, or the oil of olives, and to inject a cypher of water grauel. The following drink he has found to be a very useful laxative; take of Barbadoes aloes powdered, 3 drams, prepared kali 1/2 dram, castor oil 3 oz to 6 oz. simple mint-water and pure water, of each, 4 oz; these ingredients should be mixed and will serve for one dose. After the operation of the laxative, the fever powder is to be given once in twelve hours, and continued until it has produced considerable diuretic effect. Mr. White has given several formules for preparing this powder, e.g. 1. Powdered nitre, 1 oz. and camphor, and tartarized antimony, of each, 2 drams; or 2. Powdered nitre, 1 oz. and unwhisked cals of antimony, 2 drams; or 3. Antimonial powder, 3 drams, and camphor, 1 dram; either of these to be mixed for one dose. Warm water and mallow are to be administered frequently in small quantities,
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warm clothing, frequent hand-rubbing, and a liberal allowance of water are also necessary. And when the fever runs high, it is advisable to infest rowsels about the chest and belly, in order to prevent the recurrence of internal inflammation. When the difeafe appears to be going off, the horfe-looking more lively and active, let him be led out for a short time in some warm situation, and give now and then a malt mash for recovering his strength.

The symptomatic fever is generally occasioned by high feeding, clove flables, and want of proper exercise; in some cases it is caused by a sudden transition from a cold to a hot temperature. This kind of fever is not preceded by shivering, like the simple fever; nor is it to sudden in its attacks, except when it is occasioned by great and long continued exertion. In this case the complaint affin a very dangerous appearance in its earliest stage. The symptoms which this fever has in common with the simple fever, are loss of appetite, quick pulse, dejected appearance, hot mouth, and debility; and if to these be joined difficulty of breathing, and quick working of the flanks, with colicnes of the legs and ears, the caufe of it may be concluded to be an inflammation of the lungs. If the horfe hang down his head in the manger, or lean back upon his collar with the appearance of drowsiness, the eyes appearing watery and inflamed, it is probable that the fever depends upon an accumulation of blood in the vessels of the brain, and that the flaggers are approaching; in this case, however, the pulse is not always quickened, but sometimes has been found unusually slow. When the symptoms of fever are joined with a yellowness of the eyes and mouth, an inflammation of the liver is indicated. If an inflammation of the bowels be the cause, the horfe is violently gripped. An inflammation of the kidneys will also produce fever, and is distinguished by a profusion of urine, and an inability to bear pressure upon the loins. When the fever arises from inflammation of the bladder, the horfe is frequently flaking, voiding only very small quantities of urine, with considerable pain. Extensive wounds, and particularly those of joints, will also produce symptomatic fever. In all cases of this kind, the effential remedies are copious and early bleeding, with rowels and blisters. (See INFLAMMATION.) In cases of symptomatic fever it will generally be necessary to take away four or five quarts of blood at the first bleeding; and even six quarts have been taken away with manifest advantage.

Some modern writers on farriery have described another kind of fever, termed putrid or typhus, in which bleeding is extremely injurious. On this subject Mr. White makes the following observations. The grand characteristic of fever he conceives to be an unusually quick pulse, i.e. from seventy to one hundred in a minute; a peculiar kind of sensation which it gives to the finger, as if it were frizzed sharply by the vibration of a cord; and at the same time a feebleness, or smallness, quite different from the gradual swell of the healthy pulse. When a horfe labours under considerable debility, either from hard work, want of sufficient food, or other causes, except fever, the pulse is more or less languid or weak, sometimes flower, and sometimes a little quicker than usual; nevertheless, it swells gradually, and does not give that sensation which physicists term "hardness," and which has been already described. Simple debility, or weakness, is distinguished from fever by other circumstances: the mouth and tongue are in their natural state; the horfe readily sweats; and when the weakness is considerable, the ears and hind legs will feel rather cold, and its flanks generally move quicker than usual. If blood be drawn, it will be found very different from that of a horfe labouring under fever or inflammation. Though bleeding in such cases is extremely injurious, a mild laxative is useful, unless the dung be fetter, and is more copious than natural; and if there be a deficiency of urine, or any difficulty in voiding it, a diuretic, composed of camphor and nitre, should be given. After the laxative, tonics, with a nutritious diet, and good grooming or nursing, generally restore the animal in a short time to health. This disease is sometimes mistaken for fever, and treated improperly. Several cases have occurred where debility succeeded the inflammatory commencement, and rendered bleeding, and sometimes purging also, highly improper; and perhaps, says Mr. White, such cases have been mistaken by some writers for the typhus, or low putrid fever; or others may have copied their description of it from that given by authors on human diseases. In cases of simple debility, the following medicines have been found very beneficial, giving the laxative in the first place, if the horfe be colicive, or even if the bowels be in a natural state; during its operation, however, it is advisable to give strong gruel instead of bran mashes. The laxative is prepared by mixing, for one draught, Barbades sloes, 3 dr.; powdered canella, 1 3/4 dr.; prepared kali, 1 dr.; and mint-water, 8 oz. The tonic is composed of yellow Peruvian bark, 6 dr.; cafevalla, 1 dr.; powdered opium, 5/4 dr.; prepared kali, 1 fer.; with syrup enough to form a ball for a dose. It is often found necessary to increase the proportion of bark, and sometimes of the other ingredients; but when the horfe becomes colicive, the opium must be omitted, the most proper food on these occasions is good sweet oats, and the beet hay, given frequently in small quantities. The horfe should be allowed to drink frequently, and his exercise should be very moderate. If he become colicive, a Clyder, or even a mild laxative, may be given.

Fever, Epidemic, or Diaphemor of Horfes, generally appears in the form of a violent catarrh, or cold; the first symptoms are cough, heaviness of the head, the eyes often watery, or a little inflamed; sometimes there is a quickness of breathing; and the inflammation of the membrane which lines the nose, throat, and windpipe, is often so considerable as to cause a difficulty in swallowing; and the pulse is generally quicker than usual. Without resorting to the proper remedies, weakness ensues, and considerable fever takes place; the appetite goes off; the cough and quickness of breathing increase, and debility is so great, that the animal flaggers in his walk. The lofe discharges offensive matter; and after lingering for some time, the horfe dies from a consumption.

When an epidemic happens, horfes should be carefully watched; and on the first appearance of any symptoms of the disease, the animal should be bled moderately, unless he is in low condition, or previously exercised by hard work, old age, or unwholesome food. After bleeding, give the following laxative, viz. Barbades sloes, 2 dr.; tartarized antimony, 1 dr.; milk mixed with quantities of warm water, and then add 4 oz. of sallo oil; the whole to be given as a dose; let the horfe's diet consist of bran mashes, sweet hay, and a very small quantity of oats. A relapse should be prevented by good nursing, and giving every day a dose of some antimonial preparation, of which, that which resembles Dr. James's fever powder is the best. But when the inflammatory symptoms are at first violent, when there is a quickness of breathing, f oreness of the throat, and disflecting cough, a blister to the throat is necessary; and unless weakness forbids, bleeding even to three quarts is proper. A laxative is always beneficial at first, if the bowels be not too open; after which, the antimonial with nitre is to be given daily. Warm clothing, and freq
quent hand-rubbing to the legs, are useful; but a close
stable is injurious. "The hort should be turned loose into a
large flail; and if a discharge from the nose appear, let it
be encouraged by causing the vapour of warm water to pass
through the nostrils, and caressing the head and ears.
When the disease, from being neglected, or improperly
borne and treated at first, becomes alarming, and the weakness is con-
iderable, nothing but tonic medicines and a nutritious diet
can do any good.

Fever, in Myology, one of the Roman divinities, who
had a temple on Mount Palatine, mentioned by Cicero.
Valerian Maximus says that the bad doctors, into which they carried
the remedies used in diseases. On one monument
she is called the "Holy Fever."

Fever-Root, in Botany. See Trigostemum.
Fever-Weed. See Eryngium.
Feverfew. See Matricaria.
Feverfew, Bogard. See Parthenium.
Feverfew, in the Materia Medica, the parthenium of
Dioccorides, has been very generally employed since his
time for medical purposes. In natural affinity it ranks
with camomile and tansy, and its febrile qualities shew it to be
nearly allied to them in its medicinal character. According
in Berrias its virtues are tonic, homoeopathic, and emmenagogue. It has been given successfully as a vermi-
fuge, and for the cure of intermittent; but its use is most
celebrated in female disorders, especially in hysteria; whence it is
supposed to have derived the name "Matricaria."
Its small, tall, and analysis prove it to be a medicine of
considerable activity: so that we may lay with Murray,
"Rarius hodie preferibitrum quam debetur."

The leaves and flowers communicate by inflaion their
strong smell and bitter taste to water and rectified spirit.
The watery infusions, infilipent, leave an extract of con-
siderable bitterness, and which also discovers the saline matter
both to the talse and by throwing up to the surface small
crystalline efflorescences in keeping: the peculiar flavour of
the matricaria exudes in the evaporation, and impregnates
the diffusid water, on which also a quantity of effluent oil is
found floating. The quantity of spirituous extract, accor-
ding to Cuthener's experiment, is only about 4th the weight of
the dry leaves, whereas the watery extract amounts to
near one-half. Lewis Woodsill.

Feversham, in Geography. See Faversham.
Feugerolles, a town of France, in the depart-
ment of the Rhône and Loire; 5 miles S. of St. Etienne.
Feulliens, in Ecclesiastical History, an order of
religious clothed in white, and going bare-foot, who live
under the strict observance of the rules of St. Bernard.

The name was occasioned by a reform of the order of
Bernardus, first made in the abbey of Feulliens, a village
in France, five leagues distant from Thoulouze, by the four
Barrières, who established it about the year 1530.
It was approved of by pope Sixtus V. and the popes
Clement VIII. and Paul V. granted it its particular
fipers. King Henry II. founded a convent of Feulliens in
the Taubersack St. Honoré at Paris in 1587.

There are also convents of nuns who follow the same re-
form, called Feullienses: the first of which was established
near Thoulouze in 1590.

Feuille de Siv, in Heraldry, expresses that an
ordinary, as a fesse, pale, or the like, is indicated only on
one side; because it then looks like the leaf of a tree, as
the French phrase imports.

Feuillage, literally named by Linnaeus in honour
Schreb. 690. Julii 397. (Nandiroba; Plum. Gen. t. 27.)

Class and order, Diocese Pentandria. Nat. Ord. Cer-
trifolium? Jaff.

Gen. Ch. Male, Cal. Perianth of one leaf, bell-shaped,
rounded at the base, spreading in the upper part, cut half way
down into five segments. Cor. of one petal, wheel-shaped;
limb cut half way down into five convex, rounded seg-
ments; the centre closed with a double flar, whole rays
are alternately longer and shorter, regarding the course of the
fun. Stami. Filaments five, awl-shaped; anthers two-
loiced, roundish. There are five compreessed incurved fil-
ments, ranged alternately with the stamens.

Female, Cal. Perianth in the male, but with the ger-
men at its base. Cor. as in the male; the central flar fur-
nished with five heart-shaped plates. Pet. Germin inferior;
styles five, thread-shaped; stigmas heart-shaped. Peric. Berry
very large, ovate, obtuse, three-celled, with a woody
coat, encompassed by the calyx. Seeds several, orbicular,
compreessed, oblique.

Stamens five, with five alternate barren filaments.
Female, Cal. and Cor. as in the male. Styles three.
Berry hard, three-celled. Seeds orbicular.

Obl. The above characters, copied from Linnaeus, ap-
pear to have been taken by him entirely from Plumier's
figure; except that the division of the fruit was partly
broadened from Maregrave. We have seen the seeds, sent
from Jamaica by the name of Antidote Cocoon, which app-
ellation is mentioned in Browne's Jamaica, p. 374; and as
they agree with Plumier's figure above quoted, we are so
far right as to the genus.

With regard to the species, whether one or two, they are
to be known from Plumier and Maregrave only.

200. "Leaves heart-shaped, angular." (Nandiroba
faendana, foliis hederaceis angulis; Plum. Gen. 20.)
Native of the West Indies, or South America. Stem
climbing, ferrowed. Leaves alternate, stalked, heart-
shaped, acute, with three or five flat angles, entire,
smooth on both sides, reticulated with numerous veins,
dark green above, rather paler beneath. Stipulas none.
Tendrils spiral, foliary, simple; short as long as the
leaves. Flower-forks axillary, either with respect to
the leaves or the tendrils, compound, alternately branched,
nearly serrated. One described was, from Plumier's
figure, multifid by a leaf gathered by himself.

210. "Leaves with three (or five) lobes." (Gandh-
iroba, vel Nandiroba Brasiliensis; Maregr. Brasil. 46, cum
Sloane Jam. v. 200.) Native of Brazil and Jamaica, in
woods and hedges. This appears to differ from the
former chiefly in the form of its leaves, which are deeply
three-lobed, the lateral lobes being moreover generally
elngated at the base into two other shorter more obtuse
lobes. In colour, texture, and habit, they appear, by an
original specimn, to agree precisely with the former. The
infloruscence is so different in Plumier's, t. 210, that we
apprehend some mistake. It there consists of a few foliary
flowers, from the bosoms of small leaves on a lateral branch.
Yet this is not altogether dissimilar to Maregrave's figure.

Linnaeus seems to have been led by Browne to unite the
two in Sp. Pl. ed. 2., by the name of F. indicans; but he
together separated them in his Syll. Veg. He very errone-
only confounded with the latter his own Triosteum parvifolium, Sp. Pl. 1332, as well as the Triosteum of
Browne's Jamaica, 354, two plants unlike each other as
they are to either of the Feuillées. As great a mistake exists
in his son's herbarium, where, under the name of F. triloba,
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is found the Medsska of Rheed Hort. Malab. v. 8. 35. t. 20. This belongs to a genus hitherto not defined by flemmatic botanists, though mentioned by Julieu, for future consideration, under Peffifora. Linnaeus in his second Monitoria, 336, strangely confounds it with Convolvulus paniculatus. We have a species or variety of Modsska from Sierra Leone, gathered and ascertained by Dr. Afzelius, which flowered in September 1793, in the flower of the Lady Amelia Hunt, where we gathered and fully described it. This very plant, which was a male, bore some simple heart-shaped leaves, like those of Oreismodsska, Hort. Malab. t. 23, with others that were variously lobed, mostly three-lobed, like t. 20. See also t. 21. Such a variation, in a plant so much allied in natural affinity to Feuillea, may justify the union of its two supposed species into one. S.

FEUILLÈE, Louis, in Biography, a Franciscan friar, of the order of minims, celebrated as a botanist and natural philosopher, was born at Marseilles, in 1762. He travelled to the western coast of South America, investigating the natural productions of New Spain and the neighbouring islands, from the year 1793 to 1797. He had previously visited Carthagena, and the island of Martinique, in 1793 and 1794. There, with several other voyages, the number and course of which are not exactly recorded, he accomplished under the patronage of Louis XIV. by whom he was patronized and greatly encouraged. The king caused an observatory to be built for him at Marseilles, in which town Feuille, wore out his labours, died in 1732, aged 72. He is said to have been of that modest simple character, which belied an ecclesiastical and a true philosopher. Nevertheless, he was excited to a considerable degree of resentment against Montfieur Prezier, a rival philosoper and naturalist, sent out likewise by Louis XIV., whom he denounces at some length, in a rather contemptuous style, in the preface to the Journal of one of his voyages.

Feuille published "Journal des Observations physiques, mathematiques, & botaniques, faicts par l'ordre du Roi, sur les côtes orientales (occidentales) de l'Amerique meridionale, & dans les Indes occidentales, depuis l'année 1707 jusques en 1712," Paris 1714, in two vols. 4to. with numerous plates. This is a circumstantial and exact work, written with no elegance of style, but valuable for solid information upon all the subjects announced in its title, with various incidental matter besides. What relates to Peru makes a principal part of these volumes. The descriptions of plants occupy 62 pages at the end of the second, accompanied by 50 very tolerable plates, in which Linnaeus confided for his definitions of several species, without seeing specimens, a measure he rarely adopted. But it does not appear that Feuille was one of those writers who, having been found to have misled him, cauised him, in the preface to his Species Plantarum, to declare against that practice in future, "non vidas plantas hinc obtine, tutas chibas ab autenteribus." The reputed medical virtues of the plants met with laudable attention from Feuille, and are always added to his botanical descriptions. Haller remarks that he first published the genus Foppititis in this work, and he certainly describes some species still unknown to us, not only of that genus, but several others. (See Epipactis.) The magnificent Flori-pendio (Datura arbores) was here first made known to botanists.

He published another quarto volume, with a similar title, in 1735, in the preface to which he dedicates Prezier, as above-mentioned. The appendix, of 71 pages, with 50 plates, describes many extremely interesting plants of Chili, among which are the first described Cactœstis, the Sweet Potato, Convolvulus Batatas, whose flower is scarcely known but from this figure, the Buddlea globosa, now so common, as well as the equally common, but transcendentally elegant, Pelachia coccinea.

These 100 botanical plates were, according to Haller, published at Nuremberg in 1756 and 1757, in two vols. 4to., with a German translation of their descriptions.

The original drawings of Feuille, many of which were never published, remain in the Bibliothèque Nationale at Paris. They are very rudely coloured, and without any pretensions to the skill of a painter. Whatever merit of that kind, flight as it is, can be discerned in his plate, is entirely owing to the engraver. S.

FEUILLE, in Geography, a town of France, in the department of the Lower Saône: eight miles W. of Grenay.

FEUILLON, a town of Germany, in the principality of Culmbach: 16 miles S.E. of Culmbach.

FEUQUIERES, Anthony de Pas, Margueris, in Biography, was descended from a family distinguished in arms and born in 1648. He, following the steps of his ancestors, became noted for acts of heroism and military prowess. His conduct in the campaign in Germany, in 1668, obtained for him the rank of marshal-de-camp. For the part which he took in several actions in Piedmont, he rose, in 1693, to the rank of lieutenant-general. This was the highest promotion he obtained; and he felt most fervently the flight put on him, as he thought, impeding him whenever others were appointed marshals of France. He became the enemy of all contemporary commanders, whose conduct was rigidly scrutinized by Feuquiers. He discovered, and enumerated, twelve capital blunders which the French generals had committed at Blenheim. He published the results of his enquiries and criticisms on the generals employed by Lewis XIV., in a work entitled "Memoirs." This volume has a good reputation for cleverness of style; for the freedom of its representations, and for the depth and facility of its remarks. He died in 1711, having a few hours before his death written a letter to the king, in which, with great feeling, he recommended to his majesty's favour his only son, as innocent of what had made him unfortunate, and born of a race which had always faithfully served their king. Gen. Biog.

FEUQUIERES, in Geography, a town of France, in the department of the Oise; eight miles W. of Granvilliers.

FEUERDON, Justin, in Biography, who flourished in the 17th century, was brought up to the profession of the law, which he soon relinquished for the study of theology and the belles lettres. He obtained several respectable situations, till at length, on the death of Pelivin, in 1617, he was made professor of divinity at Guise, of which town he was already the pastor of the church. In 1629 he was nominated preacher to the court by the Landgraviess George; and in the following year he received still higher preferment at Guise. After this, his high reputation secured for him invitations from other places, but he preferred staying the remainder of his days at Guise, where he died in the year 1655. He was author of many theological works which are enumerated by Moret and others.

FEVRE, Guy de, was born in 1541, at the family seat of La Boderie, in Lower Normandy, whence he obtained the title of "Seigneur de la Boderie." It has been reported, from the bent of his studies, that he was intended for the ecclesiastical profession. He was a diligent student in the oriental languages, and had, in after life, a large share in the compendium
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fition of the Polyglott of Antwerp, of which Arias Montanus was the chief director. He complains that neither himself, nor his brother Nicholas, who had likewise a share in the same work, was properly remunerated for their labour. On his return to France he was made secretary and leguill to the duke of Alençon, who was likewise deficient in the principle of gratitude. He died on his estate at La Boderie in 1598, leaving behind him various works relative to the Syriac, Chaldæan, and other oriental languages. He translated a treatise on baptism, written by Severus, patriarch of Alexandria; and wrote some poetical pieces, by which he acquired considerable reputation among his contemporaries. His brother Anthony, born about 1555, was sometime Charge des affaires for Henry IV. at the court of Rome, and afterwards ambassador extraordinary in England, and when he left that country he received singular marks of friendship from King James and several of the nobility. An account of his negotiations, in letters written by him to the ministers, and their replies, were published 15 vols. 12mo. under the title of "Ambassadeurs de M. de la Boderie en Angleterre sous le Règne de Henry IV. et la minorité de Louis XIII."

FEVRE, of Fevre, James de, who flourished in the 16th and 17th centuries, was born at Etupes. He was of low extraction, but polished vigorous mental powers, which he improved by a diligent application to the different branches of useful and ornamental learning. He pursued his studies in the university of Paris, where he afterwards took the degree of doctor, and delivered lectures to numerous pupils in the belles lettres and philosophy. The system which he taught, or rather his opposition to old and long established theories, exposed him to the jealousy of ignorant sciolists, by whom he was accused of being friendly to Lutheranism. He was obliged to leave Paris, and, on the invitation of William Brigg and Bishop of Mener, he took refuge in the family of that worthy ecclesiastic, who was obliged, in a short time, for the sake of his own peace, and that of his family, to withdraw the protection of which Fevre so much cried in need. He was now abandoned to the wide world, and fled to Blois, thence to Guiscraine, about which time he was degraded from the doctor's degree, by the faculty of the Sorbonne. Not content with this, his enemies induced the parliament of Paris to order a process to be carried on against him; from the effects of which he was timely delivered by an order from the sovereign Francis I., who forbade them to come to any resolution against Le Fevre without his intervention. Margaret, sister to the king, and herself queen of Navarre, took the persecuted man under her protection, and honoured him with her confidence and esteem during the remainder of his life. By her authority he went to Strauburg to confer with Bucer and Capito, respecting a reformation in the church; it does not, however, appear that he was prepared to go far into the business of reformation. He continued, by profession at least, attached to the church of Rome till his death in 1557. But towards the close of life he felt unaccustomed at not having been more bold in the cause of truth. While at dinner with his patroness, the queen of Navarre, and in a company of learned men, he was observed, in the midst of the entertainment, to burst into tears, and, in explanation, he declared that his confidence accused him of being highly criminal, in having known the truth, and taught it to others, who had sealed it with their blood, and yet shrank from his duty in avowing it, and timidly taken refuge in a place of security, far from the scenes where the crowns of martyrdom were distributed. The queen endeavoured to console him, but probably without much effect; he felt that he had not done all that he might and ought to have done, and was come to that point of time in which self-deception could no longer avail. This declaration seemed to give ease to his labouring mind; he made some arrangements with regard to his property, and almost immediately expired. Le Fevre published various works that display much solid erudition, and great critical skill; and if the opinion of Simon be of weight, he is to be ranked with the best commentators of his age. His translation of the New Testament into French is highly esteemed, and is now very scarce. Le Fevre once involved himself in a contesl with Erasmus, by treating his notes on the New Testament with undue severity, and even charging the author with intentionally corrupting the scriptures, and advancing impurities. Erasmus vindicated his conduct in the most satisfactory manner, and freely forgave his antagonist, affuring him that he should, notwithstanding what had happened, continue to respect him. Such liberal conduct on the part of Erasmus produced the happiest effect on Le Fevre, who sincerely repented of his having attacked Erasmus; and "they continued," says the learned and candid Jortin, "to speak of each other with great respect and esteem;" hence, he infers, that "it would be happy if wrangling geniuses would copy from their example, and consider a little how all men of fene and manners applied such moderation, and how they abhor and despise those, who having begun on quarrel, perhaps upon mere babbles, never end their contentes and animosities, till death comes and puts them to silence." Bayle. Moreri. Jortin.

FEVRE, TANNEQUIX LE, was born at Caen in the year 165. He received a private education, and then finished his studies at the college of La Fleche, where he distinguished himself. At Paris he obtained the patronage of cardinal Richelieu, who procured him a pension of 2000 livres, as inspector of the works printed at the Louvre. At the death of Richelieu he went to Langres, where he avowed himself a Protestant, and was invited to Saumur to the professorship of classical literature. His mode of instruction was so excellent that he had pupils from all parts. Voltaire, in speaking of him, affirms, that he deplored those of his feet, and lived among them more as a philosopher than a huguenot. He died in 1672, as he was preparing to quit Saumur for Heidelberg, whither he had been invited by the prince palatine. His works were translations of, and comments on, Greek and Latin authors; he published two volumes of "Letters," and Greek and Latin poems. He wrote Latin elegantly, though not without some Gallicisms. He was a man of strict probity and integrity, of which he gave proof by dedicating a work to Pelisson while a state prisoner. Moreri.

FEVRE, CLAUDE LE, a painter, a native of France, born in 163. He principally painted portraits, but he likewise attempted flowers, and even historical subjects, but not with so great success. He came to London, where he met with much encouragement for several years, and there he died in 1675.

FEURS, FORUM SECUSIANORUM, in Geography, a town of France, in the department of the Loire, and chief place of a canton in the district of Montbrison; 25 miles W. of Lyons. The place contains 1,756, and the canton 14,016 inhabitants, on a territory of 250 kilometres, in 18 communes. About a league from this town, at the foot of a rock, called Dinzy, is a mineral spring, of a fulphureous quality.

FEUTSKING, JOHN HENRY, in Biography, was born in the duchy of Holstein in the year 1672. Having acquired a good stock of elementary knowledge, he went to Röstock
Rollock to Rady philosophy and theology, and from thence he removed to Wittenberg, where he was created doctor in philosophy, in the year 1692. Here he acquired much reputation, and was appointed professor and perpetual-ant of the diocese of Jaffa in the year 1697. In the following year he was admitted to the degree of doctor in divinity. He obtained several offices, and at length became pastor of the church of St. Bartholomew at Zerbil, preached to the court, and ecclesiastical councillor, and perpetual-ant of the diocese of Zerbil, in Amhdt, by the prince of that name. In the year 1709 he undertook the offices of professor of divinity, and afeedor of the ecclesiastical consistory of that city. At the same time he preached once a week before the electors of Saxony, and was honoured with the post of ecclesiastical councillor to the duke of Saxo-Gotha. His last appointment was that of con-
feedor to the electors of Saxony, in 1712, an office that he enjoyed but a few months, as he died in 1713, when only 41 years of age. His works, which are very numerous, are chiefly on theological subjects. They are enumerated by Mereni, who may be referred to by the curious.

FEY, in Geography, a barony of the county of Armagh, Ireland, with a village of the same name. The south and west parts of this barony are full of mountains. The soil of these mountains is much inclined to gralls, which is less coarse than that usually met with on mountain ground, so that the cattle have always full pasture, except in time of continued snow. The grass-farms are large and extensive; and there is also much tillage in this district. The Fevs abound with whins or gorse (ulex Europæus), ferns, and those plants which flourish in a warm foil. There is no limestone in the district, but either a brittle and decayed freestone with a ferruginous tinge, or a hard stone found in large blocks, which is called whinstone, but which differs from other stones called by that name. Coote's Armagh.

FEY, in Rural Economy, is a term which signifies the winnowing or cleaning of grain by means of the natural wind. It likewise signifies the bed or stratum of earthy materials by which chalk, marl, and other similar substances are covered, and which must be removed before the workmen can come at them. This sort of labour is consequently termed feyng, and is usually paid for by measure, according to the difference in depth. In both chalk and marl pits they are considered the more valuable the less the fey.

Fey is also in some districts applied to the cleaning and digging out of ponds and wells.

FEYDANY, in Geography, a town of Samogitia; 16 miles S.S.W. of Miedaki.

FEYDEAU, Matthew, in Biography, was born at Paris in the year 1616. He pursued his studies in the college of the Sorbonne, and so conducted himself in that place as to obtain the esteem of persons of all ranks. In the year 1645, he was engaged by M. de Bellegarde, archbishop of Seins, to deliver a course of instructions to the candidates for holy orders in his diocese. He obtained some preeminent in the church, and composed several useful books, among which was one entitled A Catechism on Grace, which was afterwards reprinted with the title of Illustrations of certain Difficulties respecting Grace. This work was con-
demned by a decree of the inquisition at Rome, which M. Fouquet, attorney-general of the parliament at Paris, would not permit to be promulgated in that city. In 1656, M. Fey-
dau was one of the seventy-two doctors who were expelled by the faculty of the Sorbonne, for refusing to subscribe to the condemnation of M. Arnauld, and on this account he was obliged to relinquish his church preferment. After this, for several years, he lived chiefly in retirement, and produced his Reflections on the History and Harmony of the Gospels, in 2 vols. 12mo; a work which has gone through several editions. In 1665, he was preferred by the bishop of Aheth with a prebend in his diocese; this he resigned in 1668, in order to undertake the cure of Vitré le Frangis, in Champagne. Here he officiated seven years, and was then obliged to give up his congregation in consequence of the persecutions with which his party was harassed, being bannied by a lettre de cachet to Bourges in 1677: and by another process he was sent to Annonay in the Vivarès, where he died in July 1694, in the 75th year of his age. He published many works, and left behind him many others that have not yet appeared. A long Latin epitaph was engraved on his tomb, which is preferred by Mereri.

FEY-HIANG, in Geography, a town of China, of the third rank, in Po-chesi; 12 miles S.E. of Quang-ping.

FEYJOO, Benedict Jeron, in Biography, a learned physician of the order of St. Benedict, born in Spain, who died in the year 1765. By his writings many have thought that he contributed as much towards curing the mental diffi-
culties of his compatriots, and reforming the vicious taffes of his countrymen, by introducing liberal notions in medicine and philosophy: as the great Michel Cervantes had done those of a preceding age, by writing his immortal work, the in-
comparable history of Don Quixote. In the Teatro Critico, published in fourteen volumes, are many severe and cutting refutations against the ignorance of the monks, the licentiousness of the clergy, tedious privileges, abuse of pilgrimages, exorcisms, pretended miracles, &c. &c.; by which he made a formidable body of oracles. The confess-
or of truth, he would certainly have been also a martyr, had the numerous calls of vengeance been listened to by those in power. In a superstitious country like Spain, it was sufficient only to have praised such men as Bacon, a Def-
cartes, a Newton, &c. to incur the charge of heresy. The learned part of the nation, however, undertook his defence, and he cleared the grasp of the inquisition. And although in his writings he has demonstrated the uncertainty of the healing art, and the charlatany of many among its practitioners; yet the medical college at Seville conferred on him the degree of doctor, and honoured him with a seat at their board. Mr. Bourgoing observed, that Dr. Feyjoo, or Feijoo, was one of those writers who treated this conjectural art in the most rational manner. Tableau de l'Espagne.

FEYOE, in Geography, a small island of Denmark, a little to the north of Lolland. N. lat. 54° 57'. E. long. 11° 35'.

FEYREGG, a town of Austria; 8 miles W.S.W. of Steyr.

FEYSTRIZ, a town of Austria; 15 miles S.S.W. of Ebifinuth.

FEZ, a province of the empire of Morocco, in Africa, situated to the north of Tarifa and Shawana, and having to the west the provinces of Benzahafen and Garb, and mount Atlas to the east, and stretching to the north as far as the provinces of Shans, Rif, and Garet. This was formerly a kingdom of very great extent, and still its dependences are numerous and extensive, including several mountains, abounding in inhabitants, and well cultivated. According to Jackson, the district of Fez, exclusive of the cities or towns, contains 1,250,000 inhabitants. The kingdom of Fez has been united to Morocco, since it first became an independent sovereignty in the 15th century. Although a considerable part of this country has been, and at last to the west of Old Fez abound with marshes, which render the
FEZ

air unhospitable, and the people unhealthy; the soil is fertile, and produces, in the greatest abundance, corn, fruit, flax, fat, gum, wax, &c. and also oranges, lemons, figs, and olives. The mountains abound with game, and the forests with wild beasts. The lions of Fez are the most dangerous and savage of any in Africa; horses, camels, kine, sheep, goats, and hares, are very numerous. The principal exports from this province are hides and leather of all sorts, particularly that denominated Morocco, skins, furs, wool, dates, almonds, figs, raisins, olives, honey, wax, silk, cotton, flax, horses, olibrich-feathers, gold-dust, &c.

The imports chiefly consist in spice, cuchineal, vermilion, iron, brass, steel, iron, arms, ammunition, drugs, watches, small looking-glasses, quicksilver, tartar, opium, alum, aloes, English and other linen and woollen clothes, mohair, calicoes, fullers, gold wire, silk of all kinds, brocades, damasks, velvets, and woollen caps, toys and trinkets of all sorts, Guinea cowries, combs, paper, and a great variety of curiosities.

Fez, a city of Africa, and capital of the province of that name, was built, about the end of the eighth century, by Edris, the descendant of Mahomet, and Abi, whose father, flying from Medina to avoid the proscriptions of the caliph Abdullah, retired to the extremity of Africa, and was proclaimed sovereign of the Moors. Edris, succeeding to the crown of his father, founded the city of Fez, in 793, and built the mosque in which he is buried. From that time the city of Fez has been considered by the Moors as a sacred asylum, and an object of devotion. In the first moments of that zeal which every religious novelty inspires, a still larger mosque was built at Fez, and called "Caubum," because it was founded by the Arabs of Carthage. This is one of the finest edifices in the whole empire. Many other mosques were successively built at Fez, to which were annexed, according to the custom of the Mahometans, colleges and hospitals; and this city was held in so high a degree of veneration, that when the pilgrimage to Mecca was interrupted, in the fourth century of the Hegira, the western Mahometans, as a compunction, repaired to Fez, while the eastern journeyed to Jerusalem. When the Arabs had extended themselves in Asia, Africa, and Europe, they brought to Fez the knowledge they had acquired in the arts and sciences; and, to the religious schools, this capital added academies, for philosophy, physick, and astronomy. Fez, referred to as almost all Africa, and the object of the devout pilgrimages of the Mahometans, soon became the rendezvous of the neighbouring provinces. The increase of wealth produced the love of palaces, and every species of luxury; licentiousness quickly followed; and as its progress in hot countries is always more rapid, Fez, the school of sciences and manners, soon became the seat of every vice. The public baths, which health, cleanliness, and custom render necessary, became the receptacle of the most infamous debauchery. The Mahometans of Andalusia, Grenada, and Cordova, during the revolutions of Spain, passed over to Fez, whether they brought new manners, knowledge, and, perhaps, some degrees of civilization. They taught the Spanish method of dressing and dying red and yellow gauze and silk skins, then called Cordova-weather, now Morocco, from the city of that name, where, however, the eye is kept in perfection. At Fez, likewise, they established the manufacture of milled woollen caps, worn by the Moors and eastern nations. Cozines, felt, silk, and beautiful fashions, were reared in gold and silver, are manufactured at Fez; and the little they do possess how much might be done, if usually were encouraged. Some love of learning is still preferred at Fez, where Arabic is better spoken than in the other parts of the empire. The rich Moors send their children to the schools at Fez, where they gain more instruction than they could do elsewhere.

The city of Fez contains some tolerably convenient inns; the freights are ill-paved, and so narrow that in many places two horsemen cannot ride abreast. Fez, though in times past it attracted the attention of travellers, is in no respect preferable to the other cities of the empire, except by its situation, schools, industry, and somewhat greater urbanity; yet, though more polished than their countrymen, the Moors of Fez are vain, superstitious, and intolerant. The faults, whom they pretend to have buried in that city, furnish a pretext for prohibiting Jews and Christians to enter it; and an order from the emperor is necessary to gain admission. The local situation of Fez is somewhat singular. It is seated at the bottom of a valley, and surrounded by hills in the form of a funnel, flattened at the narrow end. The upper part of the valley is divided into gardens, planted with high trees, orange groves, and orchards. A river, called Rifen, winds along the valley, watering it in various directions, turning by its streams a number of mills, and supplying water in abundance to all the gardens and most of the houses. On the height of Old Fez is a plain capable of great cultivation. Jacob-Ben-Abdallah, of the race of Beni-Merins, built in the 15th century, New Fez, contiguous to the Old, and, by its situation, keeping the latter in awe. The high town, which is fortunately situated, contains some old palaces, in which the sons of the emperor live. The new town is inhabited by some Moorish families, but, by a greater number of Jews, who trade with Old Fez, notwithstanding the contempt with which they are treated by the inhabitants; their gains, however, reconcile them to this contempt. Fez is about 200 miles N.N.E. of Morocco. Fez is said to have about 3000 inhabitants. N. lat. 33° 50'; W. long. 5° 20'. Chénevière's Morocco, vol i.

FEZZAN, a country of Africa, situated to the south of Tripoli, and 60 journies west of Cairo. Mr. Horneeman, a late traveller, sent out at the expense of the African association, a formus, that the greatest length of this cultivated part of this country is about 350 English miles from east to west, and the greatest width 200 miles from east to west; but the mountainous region of Haratish to the south and east to the south and west are reckoned within its territory. The borders of the north are Arabs, nominally dependent on Tripoli. Fezzan, to the east, is bounded by the Haratish and line of deserts; to the south and southeast is the country of the Tribbous, to the southeasterly point of the nomadic Tuaregs; on the west are Arabs. The kingdom contains 101 towns and villages, of which Mourzouk is the capital. The principal towns next in order to the imperial residence are Sougha, Sibba, and Wadon to the north, Gatron (or Kattoua) to the south, Yerma (or Jerma) to the west, and Zoua to the east. The climate is at sea level temperate and agreeable. During the summer the heat is intense, and when the wind blows from the south it is fiercelyupportable, even by the natives. The winter might be moderate, were it not for the prevalence of a black and penetrating north wind during that season of the year, and which chilled and drove to the shelter only to the people of the place; but, even myself, the native of a northern country. It rains at Fezzan seldom, and then but little in quantity. In January 1799, there were some lightnings without thunder. Tempests of wind are frequent both from the north and south. There is no rice or even violet defering notice throughout the whole country. The soil is a deep land covering calcareous rock.
or earth, sometimes a stratum of argillaceous substance. Dates may be termed the natural and staple produce of Fezzan. In the western parts some fennas is grown, of a quality superior to that imported from the country of the Tlibboos. Pot-herbs and garden vegetables are plentiful. Wheat and barley are sowed on the sandy soils, and even there few in number; they are employed in drawing water from the wells, and slaughtered only in cases of extreme necessity. The ordinary domestic animal is the goat. Sheep are bred in the southern parts of the kingdom, but the general supply is furnished by the bordering Arabs. The wool is manufactured into Abbis, or coarse woollen cloths, the general clothing throughout the country; with the meat the skins are roasted while fresh, and eaten. The horses are few; asses are the beasts of general use, whether for burden, draught, or carriage. Camels are exclusively dear, and kept only by the chief people, or richer merchants. All these animals are fed with dates, or date kernels. The commerce of Fezzan is considerable, but confined merely to foreign merchandise. From October to February Mourzouk is the great mart and place of resort for various caravans from Cairo, Bengui, Gourama, Tawat, and Soudan; and for other smaller troops of traders, Tiliboos, Turannuck, and Arabs. The caravans from the south bring slaves of both sexes, ostrich feathers, zibette, tiger skins, and gold. Iron from Bombay copper is imported in great quantities. Cairo silk, muslins, dyed and striped blue and white calicoes, woollen cloths, glass, imitations of coral, beads for bracelets, and East-India goods. The merchants of Bengui, who often join the caravans from Cairo at Angela, import tobacco, snuff, and fandery wares fabricated in Turkey. The caravans from Tripoli chiefly deal in paper, sable corals, fire-arms, fabrics, knives, cloths called abbes, and red worsted caps. Those trading from Gadames bring nearly the same articles. The smaller caravans of Turannuck and Arabs import butter, oil, salt, and corn; and those coming from the more southern districts bring linen, ollrache feathers, and camels for the slaughter house. Fezzan is governed by a sultan, descended from the family of the Sheriffs. The tradition is, that the ancestors of the reigning prince coming from western Africa, invaded and conquered Fezzan about 500 years past. The sultan reigns over his dominions with unlimited power; but he holds them tributary to the head of Tripoli. The amount of the tribute was formerly 6000 dollars; it is now reduced to 4000, and an officer of the bhadah comes annually to Mourzouk to receive this sum, or its value, in gold, jennas, or slaves. On his journey he takes travelling merchants under his protection. The throne is hereditary in the eldest prince of the royal family, whether nephew or son. The revenues are produced from a tax on gardens and cultivated lands, fines and requisitions, with a further income from duties on foreign trade; from domains of the crown, fish ponds, water lakes, &c. The public expenditure consists in the maintenance of the sultan, his court, and palace. The cadi and department of justice, the religious, and the great officers of government, are supported from the produce of date tree woods, and gardens set apart for that purpose. The dignity of cadi or judge, who is also chief of the clergy, is hereditary in a certain family. The population of Fezzan is loosely estimated at 75,000 or 75,000, all of whom, without exception, profess the Mahometan religion. The colour or complexion of the people varies; those of the northern parts have a complexion and features similar to those of the Arabs. In the southern districts they have mixed with the natives of the great nations bordering on that quarter, and bear a resemblance to the Tiliboos and the Turannuck. The genuine and indigenous race of Fezzanians may be discerned as a people of but ordinary stature, and their limbs by no means muscular or strong; their colour a deep brown, their hair black and short, their form of face such as in Europe we should term regular, and their nose left flattened than that of the negro. Their men, women, and children, abound in a want of energy either of mind or body. The tyranic government, the general poverty of the country, and their only food consisting of dates, or a kind of farmaceous pop, with no meat, and rarely with a little rauced oil or fat, sufficiently account for the abject state of the inhabitants. Throughout Mourzouk Mr. H. could not find one artificer skilful in any trade or work: indeed there are no other tradesmen but shoemakers and smiths. The latter work every metal without distinction; and the same man who forges shoes for the sultan’s horse, makes rings for his princecesses. The women manufacture woollen cloths solely by hand, as the weaver’s shuttle is unknown. The dreds consist of a shirt or frock, made of coarse linen or cotton cloth, brought from Cairo, and the abbe. The muddling claes wear frocks made in Soudan of dyed blue cloth. The richer people, and the Mandchakes of the sultan, are clothed in the Tripolitan habit, over which they wear a Soudan shirt of variegated pattern and colours, and likewise the abbe. The ornaments are chiefly confined to the head dreds, and rings on the arms and legs. The women are fond of dancing, and are wont to dance in their manners. The men are much addicted to drink and music. Their beverage is the fresh juice of the date tree, called lugabi, or a drink called buta, prepared likewise from dates. The houses are miserably contructed with fencs or bricks of a cucurceous earth mixed with clay, and dried in the sun. They are low, and the light enters by the door only. As to diet, says Mr. Horneman, I never knew a more abomnious people than those of Fezzan. Meat indeed is a food they can at no time abandon from, when let before them; but meat is not an article of food with the people in general. To indicate a rich man at Mourzouk, the usual expression is, “that he eats bread and meat every day.”

FEZZARA, a town of Egypt, on the W. branch of the Nile; 13 miles S. S. E. of Rosetta.

FI, a syllable in French notation, with which some musicians express / or, m., b. See Solmisation.

FIACONE, in Geography, a town of Genoa, on the coast of the Milanese, between Genoa and Toronta.

FIALSIO, a town of Sweden, in the province of Angermanland; 85 miles N. N. W. of Hannotal.

FI LEO, a town of Naples, in Abruzzo Ultra; nine miles S. of Terni.—Alio, a town of Italy, on the Tiber; 15 miles N. of Rome.

FIANONA, a sea-port town of Ipiri, with a good harbour; 36 miles S. E. of Treffe. N. lat. 45° 49'. E. long. 14° 18'.

FIANTS, or FOUNTS, the dung of a badger, fox, and other vermin.

FI R, in Rural Economy, a term applied, in the northern parts of the kingdom, to certain averaged returns of the prices of different sorts of grain, &c. In Earl Lothian, according to the agricultural survey of that district, from time immemorial, it has been the practice of it and the same.
F I A R.

some others to fix, by public authority, fair or average prices of each kind of grain sold within the county for ready money. In it the average is taken only of wheat, barley, oats, and peas, as these were formerly the staple produce of the country; but though at present a large quantity of beans are grown, no fair prices of them have ever been struck. In performing the business, the sheriff of the county, who strikes the fairs, calls before him, some time in the last week in February, or first week in March, a number of respectable tenants, and other persons who deal in corn; when he requires of them an account of the quantity and price of the grain bought or sold within the county, for ready money, from the time that the preceding crop came first into the market, until the day of the proof. Having procured an account of this, he strikes a general average for each of the four species of corn; he then finds the number of bills that have brought a price above that average, of these he likewise takes an average; and he proceeds in the same manner with what has been sold below the general average. To each of these rates he adds two and a half per cent., and they then form what are called the first, second, and third fairs. The addition of two and a half per cent. to the real prices must appear a singularity to strangers, who may not easily perceive either the object or propriety of it. It is explained in the following ingenious and seemingly just manner. Upon looking into the extract from the second of the fairs it will be found, that from the year 1617 down to 1647, the fairs were struck only once in the year, and as the record is silent as to the date for the first thirteen years, it is impossible now to say at what period of the year these fairs were struck; but in the year 1648 the record shows that fairs were struck twice for that year, namely, at Candlemas and Lammas. In the following year, 1649, the fairs were struck only once, but in the year 1650, and for every year down to 1675 inclusive, with the exception of the year 1665, the fairs were struck twice, namely, at Candlemas and Lammas; but in the year 1676 they again were struck only once, namely, at Candlemas; and this practice has continued uniformly down to the present time.

It is consequently extremely probable, that the two and a half per cent. was first established by being added to the Candlemas fairs for the year 1676, and was continued to be added to them for every year from that period downwards.

Upon examining the fairs for the twenty-six years, during which they were struck at Candlemas and Lammas, and taking the average of both, which seems to be the fair medium price, it will be found that, in point of fact, the Candlemas, with the addition of two and a half per cent., is somewhat below the average medium of the double fairs. This appears to account in a satisfactory manner for the origin of the two and a half per cent.; and shews, that they who first introduced it had paid considerable attention to the subject. It is evident, indeed, that fairs taken at Candlemas cannot show the average price of grain through the year, because, in the early part of the season it lies not reached its full value. Whittintide would, perhaps, be the most proper time for finding a just average, and the addition made to the fairs taken at Candlemas may amount nearly to the same thing.

It may, however, be observed, that there is one objection to the manner of striking the fairs in this county, which is deserving of attention. The first price taken is the true average, the highest and lowest are only the averages of the highest and lowest market days, whereas they should express the average of the best and worst grain. A person who makes a payment according to the highest fairs, may in fact pay considerably more than the average price of the best grainfold throughout the season. The sales of a few high market days, in which prices rife much above the level of the season, thrown into the general mass, may cause the highest fairs to be much above the current value of the best grain. It would seem to be a fairer mode to strike the fairs from the weekly prices in the Haddington market; the averages of all the market days would give the general average, while the highest prices on each market day, thrown into one mass, would throw into one mass, would furnish the true average of the best and of the world grain. The fairs in this county are, however, paid to be taken with greater correctness than in most other parts of Scotland.

In the more northern parts of Scotland, as in Perthsire, they are annually settled, in the same manner as in other counties, by a jury of traders in grain; a method which would seem to be improper, as the persons examined in respect to the prices of the grain may all have an interest in perplexing in the same way, being themselves dealers in the article of which they fix the price; whereas, were only one-third of that jury corn merchants, another third actually farming gentlemen, and the other third farmers, who pay one hundred pounds or upwards of yearly rent, every chief of the community would be represented in those meetings, every intermed were attended to, and every objection flated and considered; so that there would be every chance, that the judgment given would rest on the broad basis of the general good of the whole county. The sheriff should continue, as at present, to be the chairman of the jury, the umpire in case of an equality of votes, and have the power of judging of any objection that may be brought forward against any of the members, as a dealer in grain, which might disqualify him for holding a seat at the meeting.

The time of settling these average prices is seemingly capable of being changed for the better, as Candlemas is too early a period; as but a small proportion of the corn is by that time brought forward to be sold, and even that small portion of the crop which is threshed out, and so brought, is in a green state, and consequently disposed of at a undervalue. A fair estimate can, perhaps, hardly be made of any crop before the end of March, or perhaps a later period. As frequent decisions in courts of law are given in respect to the prices of grain, many contracts entered into, and much corn and meal sold with a reference to the fairs, as well as the rents of land, and the stipends of the clergy in various parishes, received according to them; there can hardly be a retrospective rule or regulation of equal publicity, or of equal authority devised, or more properly calculated for directing such transactions; consequently, too much care and circumspection cannot be employed in the choice of establishing them, as the medium prices of all sorts of grain, for the respective years in which they may have a reference.

However, in order to afford a better idea of what has been the average prices of grain in the first of the districts noticed above, for several years past, according to the method of forming them just described, it may not be improper to introduce a list of fairs, from 1794 to 1804 inclusive.

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<tr>
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<td>1 3 1 0</td>
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<tr>
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<td>Barley</td>
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<tr>
<td>Oats</td>
<td>0 1 8 7 3</td>
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<tr>
<td>Peas</td>
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<tr>
<td>Peas</td>
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<tr>
<td>Barley</td>
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</tr>
<tr>
<td>Oats</td>
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<td>Peas</td>
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<tr>
<td>Oats</td>
<td>1 1 2 1 1</td>
<td>0 1 9 8</td>
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<tr>
<td>Peas</td>
<td>0 1 9 2 4</td>
<td>0 1 7 1 1 1</td>
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These records of the returns of grain are highly useful and interesting, in showing the different prices of corn in different years, for a considerable period, in the northern parts of the kingdom, and afford perhaps the best views of the subject that can be given.
China and Cochinchina. Stem shrubby, climbing, without tendrils, long, woody, brachied, as thick as the arm, composed of large plant fibres, of a golden yellow, ranged in concentric circles, with perforations between. Leaves alternate, ovate, acute, entire, front margins unequally ribbed, veiny. Flowers white, minute, in long lateral clusters. Berry small, yellow, not edible. The flavour of the whole plant is bitter.

The roots and lower part of the stem are esteemed resolvent, deobriuriant, and diuretic. The bruised bulbs afford, by boiling, a yellow dye, which is not very vivid, but lasting, and serves as a basis for Turnerick and Safflower, which, though more beautiful, are not so durable.

Loureiro, from whom the above account is taken, supposes the Taba florii, Rumph. Anboin. book 7. chap. 23. t. 24. to be nearly allied to this plant, as well as the Abuta of Aublet. t. 250, 251. ins. 284. In the latter he seems to be right, as the natural order is concerned, and in the former at least equally so. That they are all one species, as he supposes, is manifestly not the case. Aublet gives his Abuta, which have downy leaves, as the Pareira Brava of the Portuguese.

FIDRÉ, in Anatomy and Physiology, is generally understood to denote the elementary component parts of the animal body: the most simple forms of the organized matter, to which the more complex organs of the frame can be reduced by the various methods of examination employed by the anatomist. In this sense, it is to the physiologist what the line is to the geometer, that from which all other figures are produced. Haller has devoted the first section of his great physiological work to the consideration of this subject. He observes that all the solid parts of the frame are composed of fibres, and that these are reducible into earth, water, oil, iron, and air. The simple fibre is invisible, and cannot even be brought under observation by the assistance of microscopes: since the smallest animals, which are only discernible by very great magnifying powers, are themselves composed of such elementary parts. He proceeds to explain that their primary and invisible fibres unite together to constitute visible fibres and plates of animal substance, from the amalgamation and connection of which our organs are composed. Our respect for so great an authority shall not induce us to repel any great confidence in such statements as the foregoing: they appear to us to be very ill examined, and therefore hypothetical. The fact is, that these supposed elementary fibres are invisible, and must lead us to receive with great caution accounts of their physical and vital properties. And the obvious differences in the composition and texture of our organs will naturally give rise to an inference, that the elementary constituents of these are probably different. We do not speak here of the chemical elements into which parts may be resolved; but of the primary animal fibre resulting from them. Without troubling ourselves with descriptions of an object, the very existence of which is not yet proved, we shall proceed to explain firstly the composition of the body, as far as it can be ascertained by our senses. In this investigation we shall find structures of very different appearance exhibited in the different organs of our frame; so that the imaginary fibre will not be found to afford the physiologist much, whatever benefit the line may afford to the researches of the geometrician. The following account is derived from the ingenious work of Bichat, entitled "Anatomy. General."

An animal body is an assemblage of various organs, each of which, exercising some function, coexists in its own manner in the preservation of the whole. These organs may be regarded as so many particular machines contained in the general machine of the individual. But the latter are made up of several structures or tissues of very different natures, which form the true elements of the organs. Chemistry has its simple bodies, which form combinations by the various combinations of which they are susceptible. In the same way, anatomy has its simple tissues, which, when combined in numbers of four or more, make up the animal organs. They are, 1. the cellular; 2. nervous of the animal life; 3. nerves of the organic life; 4. the arterial; 5. the venous; 6. that of the exhalants; 7. that of the absorbents and their glands; 8. the officious; 9. the medullary; 10. the cartilaginous; 11. the fibrous; 12. fibro-cartilaginous; 13. mural of the organic life; 14. mural of the organic life; 15. the mucous; 16. the serous; 17. the fynovial; 18. the glandular; 19. the serous; 20. the epidermoid; 21. the hairy. Such are the organized elements of our parts: they poffefs the same nature in all situations; as the simple bodies in chemistry are the same, whatever combinations they may enter into. The advantage of considering the structure of the body under this point of view is, that it is not imaginary, but real on the real foundation of observation. The lines of demarcation between the various tissues are drawn by nature, and not produced by metaphysical abstractions.

The forms are every where different; here flattened, there rounded. The simple tissues may be arranged in membranes, tubes, or fibrous bundles. But these differences of form are merely accidental. The nervous tissue forms a pulp in the retina, and cords or threads in the nerves. The fibrous constitutes fasciculi or bundles in the ligaments, and membranes in the aponyrodes. The organisation and properties are the sources of the essential distinctions.

None of the simple tissues are analogous in their organisation, that is, made up of common and of proper parts; and the former are very differently arranged in each case. In one instance cellular tissue, blood-vessels, and nerves, may exist in abundance; while in another one or two of these may be found very sparingly, or may be entirely deficient. Here we have an abundance of capillary vessels: there this system can hardly be demonstrated. The proper or characteristic parts are decidedly different. Their colour, thickness, hardness, density, &c. are all various. Simple observation is sufficient to detect the various characteristic attributes; but further properties are discoverable by the application of heat, air, water, acids, &c.

At the same time that nature belован on each system a different organic arrangement, she endowed it also with different properties. (See Life, and the account of the particular systems.) The consideration of these systems, as entering into the composition of organs, where they may be dissected independently of each other, is of the highest importance in physiology; and the separate affections of particular tissues in a compound organ will come more particularly under notice in chronic diseases.

The organic systems of the living economy may be divided into two grand classes. Those of one kind, distributed over the whole body, and present everywhere, concur not only in the formation of all the organs, but also in that of the other systems, and constitute a common and uniform basis to every organized part: these are the cellular, arterial, venous, exhalent, absorbent, and nervous systems. The others, placed in certain determined apparatuses, and foreign to the whole of the economy, have a less general existence, and are often almost isolated. Such are the offensive, cartilaginous, fibrous, muscular systems, &c. &c. Bichat calls the former the generating systems. All organized parts are not necessarily provided with all the six. Some have no arteries.
arteries nor veins; some no nerves, &c., but they meet together in most of the organs, and there are always some present, although others may be wanting. Thus tendons and cartilages, which have no blood, possess exhalants, absorbents, &c. The two last-mentioned sytems are the most universally found. Nutrition supposes their existence: that function, in fact, results from a double motion, of composition which brings nutritive matter to the organs, and of decomposition which removes it. The exhalants are the agents in the first of these motions; the absorbents in the second. Since every organ is nourished, and the mechanism of nutrition is uniform, it follows that these two sytems must belong to all organs. The cellular exils the most generally after these. It is sometimes found where there are no blood-vessels, and it always exists where there are found. The arteries and veins come the next in order: often there are no nerves where these penetrate, as in the apancreoses, the fibrous membranes, &c. The nervous is that of all the generating sytems, which can be traced into the fewest organs. The nerves, membranes, the fibrous, fibro-cartilaginous, and bony sytems, &c. appear to want it.

The generating sytems, besides entering into the structure of other organs, also belong reciprocally to each other. Thus, cellular fabulence is found in the nerves, arteries, and veins; the latter ramify in the cellular fabulence, &c.

It will be expected, from the preceding observations, that the generating sytems, considered as the common basis of all the organs, ought to be developed more early than the others; and we find this in the fetus. The nerves, with their centre, the brain; and the arteries and veins, with their central organ, the heart; the cellular tissue, the exhalants and absorbents all present this phenomenon. With respect to the two latter, it is sufficiently clear from the great activity of absorption and exhalation at this period.

The general sytems must perform the most important part in the office of nutrition. They constitute the nutritive parenchyma of every organ: this is the cellular, vascular, and nervous matter, into which the nutritive fabulence of the organ is deposited. The latter, different in every instance, constitutes the difference of the various organs. It is phlo-plate of fine and gelatine in the bones; gelatine only in the cartilages, tendons, &c.; fibrine in the muscles; albumen in other organs. If, therefore, the nutritive parenchyma of a bone was filled with fibrine, it would constitute a muscle in the form of a bone, and under the opposite circumstances, we should have a bone in the form of a muscle. The nutritive fabulence are histerto for the most part unknown to us: but as the parenchyma is greatly analogous in all cases, if the former were removed, the only differences would be in form, volume, a rangement of cellular laminas, and of vessels and nerves; without any essential variation in nature and composition.

The mucous mafs of the fetus, in the early periods of conception, seems to be merely an aestimulage of general sytems. The organs exist only in their nutritive parenchymas. As these grow, and become developed, the nutritive matters penetrate them; and then each organ, histerto figurar in its nature to others, begins to be distinguished, and to possess an isolated existence; each derives its appropriate fabulence from the blood.

The sytems of the second kind belong only to some particular apparatus of the animal economy: thus, the sifonous, muscular of animal life, cartilaginous and fibrous are peculiarly set apart for the locomotive organs; the feroous, mucous, muscular of organic life, &c. belong to the digestive, respiratory, and circulating apparatuses, &c. All these, therefore, are much more isolated, and perform a less extensive five part in the animal fabric. Concentrated in peculiar organs, they are foreign to others, and have an independent life; while the vitality of the primitive sytems is blended with that of the organs, into the composition of which they enter. The different parts of these sytems are not connected together; and this is exemplified in the bones, muscles, cartilages, glands, &c.; various organs of different nature, and belonging therefore to other sytems, are interposed between them. The primitive sytems, on the contrary, are every where continuous, and uninterrupted. The cellular, arterial, venous, absorbing, and nervous sytems, are fo disposed, that, if we were possible to remove all the organs, which they penetrate, and leave them only, there would still be a whole continuous fabric, but be deprived. If, on the contrary, the organs, intermediate to the bones, cartilages, fibrous, cartilages, &c. were removed, the various parts of these sytems would be immediately isolated. The particular accounts of the different sytems will be found under their respective articles in the Cyclopædia.

**Fibre.**

Fibre, Animal, fibrin, muscular fibre, in Chemistry. The muscle or fil of animals is composed of as many number of cylindrical, soft, nearly inelastic, semi-transparent fibres; these, when examined by the microscope, are seen to be filled with fibrous sublimated into bundles of parallel shreds, bound together by very fine cellular membrane. The living muscle is moreover penetrated by arteries, veins, nervous fibres, and lymphatics with their contents; and thus a considerable quantity of extraneous matter is mingled with the pure fibre of the muscle, so as to throw a certain degree of ambiguity on the chemical analysis of this latter fabulence. By means, however, of maceration with cold and hot water, and mechanical pressure, much of the foreign matter may be got rid of, after which the fibre exhibits the following properties.

Its colour is greyish white; in the state it is infusible, its texture is stringy; it hardens rather than softens by the long-continued action of hot water. When dried slowly in a warm air it becomes semi-transparent like horn, and very brittle.

Fibre, prepared as mentioned above, is entirely infusible in water, in most of the acids it dissolves readily; with the dilute nitric acid it gives out a large portion of azote gas of great purity, but it stronger nitric acid is made use of, a more complicated action takes place, by which according to Berthollet, one portion of the fibro is changed into a kind of fatty fat, which floats on the surface of the liquor, while the rest is converted into oxalic acid.

Mr. Hatchett's valuable experiments on this fabulence throw great light on the composition of muscular fibre, and point out a variety of before unnoticed points of resemblance between fibre and condensed albumen. Of these, the principal are the following; muscular fibre (previously expansil by long maceration in cold and hot water of every thing soluble in this liquor) was dipped for a fortnight in nitric acid, dissolved with various parts of water, and the end of that period the acid was become yellow, and had removed the properties of a nitric solution of fibrin. The undissolved residue, which could not of far the greater portion of the fibro, being thoroughly triturated by the acid, was dissolved in boiling water, in which it dissolved, the liquor upon afforded a gelatineous milk, which, after being clarified in water, was precipitated by the addition of nitric acid, and a mixture of tin, precipitated with the fleshy part of the fibro, and as the solutions of albumen. Thus penetrating and thoroughly, by nitric acid, is for the most part soluble in water, forming a liquor of a brownish orange colour. By digestion with potash the albumene is given out, and a tanninaceous matière produced.
If washed fibre, however, is treated with boiling nitric acid, the solution still more resembles that of albumen in the same menstruum, but with this additional circumstance, that, on superheating with ammonia, a copious white precipitate falls down, consisting of the phosphat and oxalat of lime, the former of which pre-existed in the fibre, while the acid of the latter was produced by the action of the nitric acid on some portion of the fibre, and then united with the lime which naturally exists in fibre, in the state of carbonat. Lime, therefore, is found in muscular fibre in two states; as a phosphat, which is chiefly separable by long boiling, and in some other state in which it is not soluble in water, but remains ready to combine with the oxalat acid so soon as formed; this state is probably the carbonat, and the quantity of lime thus combined is such as to afford 17 grains of dry oxalat from 200 grains of dry fibre.

The proportion, however, of earthy salts contained in fibre varies greatly, according to the age of the animal; for it appears from Mr. Hatchett's experiments, that though beef contains both phosphat and carbonat of lime, veal gives hardly any indication of the latter, and a much smaller proportion of the former.

The analysis by fire shows the following very notable difference between gelatine, fibre, and albumen, (the three great constituents of the soft parts of animals) in their proportions both of carbon and earthy refidue.

500 grains of sinews, being gelatin in its purest form, distilled with a strong heat in closed vessels, left 56 grains of refidue, of which 54.7 disappeared by subsequent calcination in the open air, and therefore were carbon, the remainder, amounting to 1.5 gr. appeared to be phosphat of soda, with a trace of phosphat of lime.

500 grains of dry albumen, treated in the same manner, gave 63.25 grs. of carbon, and 11.25 grs. of refidue, consisting of soda in a semi-carbuncle state, together with phosphat of soda, and a very small portion of phosphat of lime.

500 grains of beef, well washed and dried, gave 82.1 grs. of carbon, and 25.6 of refidue, the greatest part of which was carbonat of lime, mixed with some carbuncle fibre and a little phosphat; this is to be observed, however, that this is by no means the whole earthy contents of the muscle, as by its previous digestion in boiling water nearly the whole of the phosphat of lime would be dissolved out.

The general inference from these experiments, and from others that have been mentioned under the article Albumen is, that the principal constituent of muscular fibre is a substance which, from its habits with the principal chemical reagents, may be considered as nearly identical with infusitated albumen.

A few miscellaneous circumstances concerning muscular fibre may be added. When thoroughly washed and freed from all that can be extracted from it by cold water, it does not readily putrefy; but in its natural state it soon undergoes this change, the texture becoming flabby and loose, the colour pale, and the odour exceedingly rancid. The flesh of young animals putrefies sooner than that of old ones in similar circumstances. When imbibed in running water, emburied under ground in large masses, it changes to that singular fermentative matter already described in the article Acidulce. When slowly and thoroughly dried, and kept in a dry air, it will remain long without undergoing any change. Alcohol deprives it of colour, hardens its texture, and effectually prevents the access of putrefaction; and it may be observed that antiseptics in general are more efficacious in preserving muscular fibre than any other of the soft parts of the body.

The most important of the volatile products of the dry distillation of fibre is ammonia, which also indicates the presence of much azot in the fibre itself. An acid also is given out at the same time, which is acid, muriatic, and has the peculiar odour of roasted meat. It was first described by Berthollet as a peculiar acid, and was named by him the zoanic; the general opinion of chemists however at present concerning this substance is, that it consists of septic acid, fouded and rendered empymematic by the action of heat on the substances from which it is procured.

Fibre, Vegetable. Almost all plants contain a fibrous matter, which is distinguished from the other vegetable principles by its comparatively inoffuscibility in chemical menstrua, its indissolubility by spontaneous decomposition, and a certain toughness and elasticity occasioned by its minutely fibrous texture. In some plants these fibres are remarkably flexible and tough, as in the flax, the hemp, the alfa, and the inner bark of the lime, the birch, and other trees that furnish the materials of Rutilia matting; in the cane and bamboo these fibres, though still considerably flexible and elastic, are inferior to those produced by the preceding plants; and in the ligneous fibre or wood of the larger trees they exhibit still greater density and diminished flexibility. The chemical characteristic of vegetable fibre is, that it presents on analysis a greater proportion of carbon and earthy matter than any other vegetable substanee; as will be detailed at length under the article Wood.

FIBRILLAE, a little fibre, or capillament.

FIBRO-CARTILAGE, in Anatomy, a tisue of the animal body, partaking of the characters both of ligament and cartilage. An ingenious French anatomist distinguished it by this name; and he has included, under the expression fibro-cartilagineous syltem, all those parts of the body which exhibit this kind of structure. From the mixed nature of their properties, the fibro-cartiligious organs have been partly arranged among the ligaments, and partly among the cartilages. They may be conveniently arranged under three divisions.

1. The membranous fibro-cartilages; as those of the ear, nose, trachea, eye-lids, &c. They are very thin, disposed in an uniform plane, or convoluted in various directions.

2. Articular fibro-cartilages; of very variable forms, but in general thick; interposed between the opposite ends of bones, in some instances unconnected by their surfaces, and moveable, in others closely attached, as in the vertebrae.

3. Fibro-cartilages of tendinous sheaths; consisting of a thick layer covering the bone in some instances, where the tendon passes over it. The structure and vital properties are not exactly the same in all these organs.

The peculiar tisue of this system is composed, as some indicates, of a fibrous substanee, with the addition of a true cartilage. The former seems to be the basis of the organ. It is very distinct in the naihes which connect the bones of the vertebrae, but much less so in the membranous fibro-cartilages. The fibres are sometimes parallel, and sometimes interwoven. This fibre is exactly of the same nature as in the fibrous syltem, compact, hard and strong; and hence arises the strength of the different organs belonging to this system. The solidity of the union which connects together the bodies of the vertebrae, and the difficulty of removing the fibro-cartilages of the knee, jaw, or clavicle, sufficiently exemplify this. These organs bend in every direction, whereas the true cartilages, if powerfully bent, would break. The cartiligious substanee is interposed between the fibres, and is particularly discoloured in the articular fibro-cartilages; which owe to it their elasticity, white colour, and the
the inorganic appearance exhibited by a fiction. These are rendered yellow and transparent by boiling, and are converted into jelly, although not quite so readily as the true cartilages. The fibro-cartilages of the organs of sense, which we have already adverted to in the article Cartilage, are not resolved into gelatine by boiling: they are softened, but remain whitish. After some time their fibrous membrane is detached, and the substance itself breaks in several places. After macerating for some days they become red. Defaecation renders them hard and brittle, without imparting the yellow colour which tendons or aponeuroses receive on such treatment. The inter-vertebral substances have, when dyed, a remarkable transparency, without any yellow tint. They swell when detached, and placed in water.

The fibro-cartilages in general have no perichondrium. Those of the tendinous sheaths are in contact on one side with the bone, and by the other with the synovial membrane. The articular ones are covered by the synovial membranes of the joints, and those of the vertebrae are covered only by the anterior and posterior vertebral ligaments. A very distinct and closely adhering fibrous tissue covers those of the organs of sense; and is rendered white by maceration.

The cellular texture is difficultly seen in these organs; but maceration brings it into view. Very little blood circulates through them in the ordinary state; but they become vascular when inflamed. No nerves can be traced into them.

This system is distinguished most particularly by its elasticity. The fibro-cartilages of the organs of sense and of the trachea, when bent, immediately restore themselves; and those between the vertebrae, being compressed by the motions of the bones, resume their former state, as soon as the compressing force ceases to act. (See Cartilage.) They have the power also of bending in every direction, without any risk of being broken. They possess extensibility, and contractility.

Their vital properties are very obscurely marked. They have no animal sensibility or contractility in the natural state; but the former appears under inflammation. Organic sensibility, and insensible contractility, exist in these organs as far as they are necessary for the purposes of nutrition. This obscurity of the vital properties renders all the vital phenomena very slow. If the ear of a dog be cut, and the fides of the incision brought together, the skin quickly unites; but the cartilage is not agglutinated until long after. From the same cause we must explain the rare occurrence of dissection in these organs. No parts in the body are so seldom diseased as the fibro-cartilages of the nose, ear, trachea, &c. Gangrene produces hardly any alteration in them, and it is almost doubtful whether they ever suppurate.

This system is developed at an early period: the ends of the bones are large in the fetus, and the articular fibro-cartilages are consequently considerable. Those of the tendinous sheaths are not to be distinguished from the cartilaginous epiphyses which in the fetus form the ends of the bones. The gelatinous portion exceeds the fibrous part in the fetus; particularly in the inter-vertebral spaces; and its proportion is in all always in an inverse ratio to the age of the subject. The membranous fibro-cartilages are developed very early in the fetus.

The parts become stronger and more dense as the age advances; and in the old subject they take a hard form. Hence the stiffness and inflexibility of the vertebral column.

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The fibro-cartilages are much less prone to ossification than the cartilages. This change has never been observed in the membranous ones. Those of the vertebrae are almost the only ones in which effusive matter is sometimes deposited, and this is very rare. Bichat, Anatomie Generale, tom. iii.

FIBROLITE, in Mineralogy, a substance first noticed by the count De Bouron, and found by him among the mastix of Corundum, from India and China. It is of a whitish or dirty whitish grey colour; it occurs in masses of an indeterminate form and fibrous texture. The count De Bouron has only once seen a specimen that had a tendency to a regular form, which was that of a rhomboidal prism of about 60° and 80°. Longitudinal fracture fine fibrous, the fibres in some specimens interwoven in all directions; crescent fracture, compact, with a vitreous infusible. Translucent at the edges. Hardness about as quartz, when tried in a direction perpendicular to or across the fibres. Gives spurs with ease, and a deep reddish phosphoriferous light when rubbed against an hard body. Not electrical by friction. Specific gravity about 2, being, like all fibrous substances not found in a crystallized state, of different degrees of density. Inifiable per fer by the blow-pipe. Analysis by Mr. Chenex of fibrolite from the peninsula of India and China.

<table>
<thead>
<tr>
<th>Substance</th>
<th>Specific Gravity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica</td>
<td>3.48</td>
<td>White, translucent, gelatinous, amorphous, resembling that of the cornea of a jellyfish.</td>
</tr>
<tr>
<td>Alumina</td>
<td>2.58</td>
<td>White, translucent, gelatinous, amorphous, resembling that of the cornea of a jellyfish.</td>
</tr>
<tr>
<td>Iron, a trace</td>
<td>5.25</td>
<td>White, translucent, gelatinous, amorphous, resembling that of the cornea of a jellyfish.</td>
</tr>
<tr>
<td>Lofs</td>
<td>3.75</td>
<td>White, translucent, gelatinous, amorphous, resembling that of the cornea of a jellyfish.</td>
</tr>
</tbody>
</table>

The remarkable circumstance of the fibrolite from India yielding nothing but silica and alumina, and its always occurring in amorphous masses of a fibrous texture, induced the discoverer to give it the above name. See the interesting paper on Corundum, by the Hon. Mr. Greville and the count De Bouron, printed in the Phil. Trans. for 1802.

FIBROUS SYSTEM, in Anatomy. This includes a great many organs of the body, composed of the same elementary parts, but differing widely in their forms. Varieties, together with the differences of function and position, occasion them to be distinguished by the names of tendon, aponeurosis, ligament, &c. For these are not under any general term, like that of muscle, or nerve in the muscular or nervous systems, to denote the organisation whatever the form of the organ may be. There are two leading divisions of form, under which all the fibrous organs may be arranged, i.e., the membranous, which thin and broad; and that of chords, which is thick and elongated.

I. Division. Fibrous organs of the membranous form, including fibrous membranes, fibrous epidermis, tendinous sheaths, and aponeuroses. The fibrous membranes are the pericardium, dura mater, sclerotics, subligaments, and capsules of the kidney, spleen, &c. They generally envelop the organs, and enter into their texture. The fibrous epidermis consists of cylindrical bags, surrounding cartilage, cartilages, particularly those of the humerus and femur, which connect very closely to the capsule and synovial membrane. The sheaths confine the tendons rolling over bones, and when they are reflected wherever they are reflected they are subject to displacement from the muscles; and in consequence, transmit imperfectly to the bones the motion imparted by the muscles. They may be divided into two divisions: 1. Such as are common to the tendons of flexor muscles, as at the wrist and tarso; 2. Such as belong to one tendon only, or two, as in the fingers and toes. Aponeuroses consist of large sheets of fibrous texture, being:
to the locomotive organs, and disposed in some instances so as to form coverings of parts; while in others they afford points of attachment to muscles. Hence they are distinguished into aponeuroses for enveloping, and aponeuroses for insertion. The former either surround the muscles of a limb, forming for it a general sheath, as in the thigh and forearm; or else they invest and confine some particular muscles, as that which extends between the two posterior serrati, that which is placed in front of the soleus, &c. The aponeuroses of insertion either form broader or narrower surfaces, as at the attachment of the triceps femoris, rectus crus, gastrocnemius, &c.; or they consist of separate fibres, giving distinct attachments to the muscular fibres, as at the origin of the iliacus internus, tibialis anticus, &c., or they form arches, which both give attachment to muscular fibres, and at the same time allow the passage of veins, as at the diaphragm and calf of the leg.

2d Division. *Fibrous organs in the form of chords,*—constituting tendons and ligaments. The former are placed at either of the attachments, or in the middle of muscles. They are generally simple, consisting of elongated chords; but in some cases they are more complicated, being divided into several smaller chords. Ligaments tie together the articular surfaces of bones. They may form either constant and regular fasciculi, as at the elbow, knee, &c. or irregular ones, as at the pelvis.

The following table exhibits the fibrous organs according to the preceding arrangement.

<table>
<thead>
<tr>
<th>Fibrous Organs</th>
<th>Partial,</th>
<th>General,</th>
</tr>
</thead>
<tbody>
<tr>
<td>In the membranous form,</td>
<td>For envelopment,</td>
<td>For infection,</td>
</tr>
<tr>
<td></td>
<td>Partial,</td>
<td>General,</td>
</tr>
<tr>
<td></td>
<td>In a broad surface,</td>
<td>In the form of an arch,</td>
</tr>
<tr>
<td></td>
<td>Simple,</td>
<td>Complicated,</td>
</tr>
<tr>
<td></td>
<td>With regular fasciculi,</td>
<td>With irregular fasciculi.</td>
</tr>
</tbody>
</table>

Fibrous membranes, Fibrous capsules, Fibrous sheaths, Aponeuroses, Tendons, Ligaments,

Although the numerous organs included in this table belong to parts of very different structures; although they seem disposed irregularly in the animal economy, without mutual connection, and apparently isolated; they are in fact nearly all continuous. The common centre of this system is the periosteum, with which all its parts are closely connected, excepting the albuginea, the coats of the kidney and spleen, and the perichondrium of the larynx.

Organization of the fibrous system.—This is nearly the same, under all the variety of forms which have been just particularized; and consist of a peculiar tissue, with vascular, cellular, and other textures.

All fibrous organs have for their basis hard, inelastic, and infusible fibres: incapable of contraction; sometimes parallel to each other, as in the tendons and ligaments, sometimes variously interwoven, as in the capsules, membranes, and sheaths; of a white or grey colour, and great powers of resilience.

The latter property enables all these organs to sustain great efforts; and they are employed in offices which require such a power. The ligaments firmly hold the articular surfaces in contact. The aponeuroses confine the muscles and resist their displacement. The tendons are placed between two powers;viz. the powerful energy of muscular contraction, and the greater or less resistless force, which that action is designed to move. The resistless power of the tendons is in many instances superior to that of the bones: thus, the patella, the olecranon, and the os calcis may be broken by muscular contraction. The difficulty of producing luxations in the dead subject, and the great force required in the former barbarous punishment, of fixing four horses to the four limbs of a criminal, in order to tear them asunder, sufficiently exemplify the great strength of this tisue. A tendon requires an enormous weight to bend from it to break it. Yet this resilience, however great, is sometimes overpowered in the living body; and we see the strongest tendons, as that of the calf, ruptured by muscular contraction. We cannot help being surprised, on these occasions, that the soft tissue of the muscles should not yield rather than the tendons.

Some anatomists have fancied that the fibrous and muscular systels were analogous, and have affirmed that a tendon is formed by the conduction of the muscular fibres. This notion is altogether absurd. The fibrous membranes and aponeuroses are expanded, but they resemble muscular fibres in no respect. The chemical composition, the vital properties, and the apparent texture are widely different. Their functions have not the least analogy. In fact, there is no resemblance between the muscular fibres and the tendon, in which they are inserted, than between the latter and the bone, to which it is attached.

What then is the nature of the fibrous tissue? This we cannot determine, as we cannot recognize in it any very determined character. Its properties are rather negative. It has not the contractility of the muscular, nor the facility of the nervous tisue. It is always passive, and obeys the motion impressed on it, without having any of its own.

The parts, in which this is found, are very different from the skin, the cellular texture, cartilage, &c.; and hence the referring of all these to a common class of white organs is a premature generalization, resting entirely on external appearances, and imperfect analysis, in which the texture, vital properties, and functions of the organs are disregarded.

The fibrous tissue, exposed to maceration at a moderate temperature, does not experience any change for some time. Its density gradually diminishes, and its substance softens, but it does not swell. The fibres may now be drawn asunder, so as to expose the connecting cellular tissue. After a very long period they are reduced into a soft whitish pulp, of homogeneous appearance. Tendons are the fuscet acted on; then aponeuroses of infection; afterwards those of envelopment; then the fibrous membranes, capsules, and sheaths; and lastly ligaments.

Any fibrous organ plunged into boiling water, or exposed to considerate heat, curls up, and becomes contracted, like most other animal tissues: its volume is diminished, it becomes

{Simple, | Complicated. |
| With regular fasciculi, | With irregular fasciculi. |
comes more solid, and acquires an elasticity, which it had not in the natural state, and which it loses again, when softened. The force with which the fibres contract on exposure to heat is very considerable.

It is sufficient, when bones are boiled for a long time, to produce rupture and detachment of the perioleum; and, when the bones, surrounded by their ligaments, are exposed to the action of boiling water, to lock the articular surfaces so closely together, that they cannot be moved.

The fibrous tissue softens in boiling water, becomes yellow and semi-transparent, and at last is partly dissolved. These changes take place most quickly in the tendons, then in the aponeuroses, the membranes, the capsules, and fibrous sheaths, and lastly in the ligaments. But all ligaments do not soften equally. Those which connect the spinous processes of the vertebrae, at their roots, do not undergo the same changes, but remain white and tenacious.

The evaporation consequent on exposure to the air destroys the whiteness of the fibrous system; it contracts, becomes yellow and transparent, and is easily broken. By immersion in water, in a few days after being dried, the whites and softness are recovered, and the part regains nearly its original appearance. This is particularly the case with the tendons. Nitrous and sulphuric acids soften the fibrous tissue very quickly, and reduce it into a blackish pulp in the latter, and yellowish one in the former case. It curls up and contracts when first plunged into the acid, as it does on exposure to boiling water.

It resists putrefaction for a considerable length of time, and remains unaltered, when skin, muscles, nerves, &c. are completely disorganized. But it yields in the end.

Cellular texture exists in all fibrous organs; being more or less abundant, in proportion as the fibres are more or less approximated. Maceration renders it obvious enough in all cases. As the cellular tissue itself can hardly be perceived, no fat can be distinguished in it. But an adipose exudation has been noticed, in some instances, after fibrous organs, carefully cleaned from all surrounding substance, have been dried. Tendons are found in very different states in different parts of the fibrous system. They are numerous in the dura mater and perioleum, very few in the aponeuroses, and not discernible at all in the tendons. The former organs are the most liable to inflammation and swelling. Abscesses have not been detected in the fibrous system nor nerves.

Properties of the fibrous system.—Its elasticity is very striking; but becomes considerable, when parts are removed from the body, and dried. Thus tendons, and strips of aponeuroses, which are insensible of vibration in their fresh state, produce sound when very dry.

The extensibility and contractility of these organs is not considerable; and it always takes place slowly. The fact is exemplified in hydrocephalus, swellings of the bones, tumefaction of the limbs, dilatation of the abdomen, &c. If the force be applied suddenly, and the resistance of the fibrous organ too great, various symptoms arise. Prefere of the most painful kind, and dangerous consequences, is produced on the contained parts, as in inflammatory tumefaction of the limbs, inflammation of the teliis, eyeball, &c. When the power is too great, the organ is torn, as in the rupture of the tendo Achillis, of the ligaments in luxations, &c. The contractility corresponds in its kind and degree to the extensibility; no fibrous organ can be suddenly extended, so it cannot recover suddenly after dilatation. Hence, when a tendon or aponeurosis is divided in the living state, there is scarcely any separation of the margins. The separation consequent on rupture of a tendon arises from muscular contraction, or from the position of the limb. Indeed, if the muscle be in a state of action, the end of the divided tendon attached to the muscle is drawn away from the other a little; but that portion of the tendon which is fixed to the bone undergoes no change. When a tendon is divided, while the muscle is relaxed, no separation ensues.

The vital properties of these organs have been a subject of great controversy among physiologists. Numerous experiments have been instituted, and many works published on the question. Whether or not they possess sensibility, Haller and his followers maintain the negative, and their publications contain a vail of experiments. There is little doubt that they possess feeling, or, what Bichat calls animal sensibility; although this does not flow itself by the usual phenomena. The different mechanical and chemical stimuli produce no pain, unless the organ be inflamed. This is the case with the tendons, the aponeuroses, the fibrous membranes, and the ligaments, when exposed and cut in operations, or irritated chemically in living animals. But, if these parts are suddenly exposed to violent dilatation or twirling, acute pain is produced. Bichat appeals, for the proof of this statement, to experiments on living animals. And he considers that this mode of sensibility is appropriate to the functions of the organs. They have no concern with exterior forces of excitation; but, in performing their offices, they are liable to be drawn, twisted, and stretched in the motions of the limbs. The senation, which they transmit in these cases, is a warning of the danger, by which its further progress is prevented. The great pain of lusations, and of the extension employed for their reduction, and of brains, seems to confirm the preceding statement.

These organs possess no animal contractility. They have organic sensibility, and organic insensible contractility in common with all other organs.

The vital powers are more developed in this than in the bony and cartilaginous systems. The peculiar kind of feeling, which we have just explained, is a proof of this. It is much more frequently the seat of pain and inflammation, and the pain is much more acute. This is exemplified in rheumatism, which affects the fibrous organs about the articulations. It seems that this system, hardly in any infaile, forms pus.

In the gelatious substance, of which the embryo consists, the fibrous organs can hardly be distinguished; and they cannot be recognized until several other parts are formed. The fibres are not perceptible until towards the seventh month; and, as they increase, the organs become more hard and resilient. They possess at this time a peculiar white sheen, of a very fine degree. It is only by degrees that they acquire the firmness which particularly characterizes their tissue.

The comparative softness of these organs in the first years of life will explain many circumstances both of natural phenomena and diseases. As the subject grows up, the fibrous system becomes dense and hard; and it remains stationary in the adult. It is still more compact in old persons; yielding less easily to putrefaction and maceration. Hence the flabbiness in the articulation at this period. All the parts now become yellow.

The fibrous membranes will be considered under the article Membrane. The capsules are described in the account of the articulations to which they belong. See Extremities.

The fibrous sheaths belonging to one tendon form a canal, in which the tendon runs. There is a channel in the bone, completed into a canal by the fibrous organ, and lined
FIBROUS.

internally by a closely adhering synovial membrane, which is reflected to the retained tendons at the extremities of the canal. These sheaths are connected externally to the surrounding parts by a loose cellular texture. They are extremely dense in their texture, and in proportion to the efforts which they have to sustain. The particular sheaths will be described in the account of the muscles to which they belong. The larger ones of the hand and foot, common to several muscles, are described in the article Fascia.

The aponereos of envelopment are considered under the article Fascia. Thos of infection, belonging so effectually to the muscles, will be treated, as well as the tendons, under Muscle.

The ligaments will be spoken of in the account of the structure of Joints. This article is drawn entirely from the Anatomic Generale of Bichat, vol. iii.

Fibrous Amethyst, or thick fibrous amethyst. It is generally of a dark violet blue colour, sometimes of a pale and lighter one, which borders on grey, from which it passes to bluish and yellowish-white. It occurs only massive and in rolled pieces. Internally it is glistening, sometimes shining, and is vitreous. The principal fracture is thick fibrous, and is straight and diverging fibrous; the fracture in some instances is intermediate between thin fibrous and splintery; the edge fracture is generally imperfectly conchoidal, approaching to uneven and splintery. Commonly translucent, but varies from that to transparent. Hard, rather more so than rock crystal; gives sparks with file.

Not very difficultly frangible. Specific gravity 2.750. According to Karsten it is composed of

<table>
<thead>
<tr>
<th>Material</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica</td>
<td>97.5</td>
</tr>
<tr>
<td>Alumina</td>
<td>0.25</td>
</tr>
<tr>
<td>Iron</td>
<td>0.50</td>
</tr>
<tr>
<td>A trace of Manganese</td>
<td>98.4</td>
</tr>
</tbody>
</table>

Infusible per se in the strongest heat of a wind furnace, but melts upon charcoal when exposed to a stream of oxygen gas.

It is found in large veins, and is generally accompanied by common amethyst. When both kinds occur together the fibrous is supposed to be the oldest, as it adheres to the sides of the vein. Its geographic situations are very numerous; it is found in abundance in various places in Saxony, in the East Indies, Spain, the Uralian mountains, &c. The most beautiful specimens are brought from Catherinesburg, in Russia.

The lols of its colour by heat indicates either that the colouring matter is very volatile or very little in quantity; and it has been doubted, by some philosophers of great reputation, whether this and many other highly coloured stones owe their colours to metallic oxides, or to some unknown modification or affection of light; and it is well known that flour and other phosphorescent stones lose their power of emitting light with the loss of their colour.

Fibrous Gypsum. — See Gypsum.

Fibrous Limeflone. This subspecies is usually divided into two kinds: 1. Common fibrous limeflone. 2. Fibrous limeflone, flàlātīce, kalkfinter of Werner.

1. Common Fibrous Limeflone. — Its colours are white, greyish, or yellowish-white, and sometimes reddish-white. It occurs massive. Lustrous glistening, often shining, and is pearly and chatoyant, particularly when cut and polished. Fracture from coarsely to extremely delicately fibrous. The fibres straight, undulating, or contorted, and are generally parallel, sometimes diverging. Splits easily in the direction of the fibres. Fragment prismatic; edge fracture perpendicular to the former. Moderately translucent. Rather harder than crystallized carbonate of lime, which it feraciously. Specific gravity 2.7. The beautiful variety called flàlātīce was first discovered, in 1798, by Mr. Mawe, in small veins, lying between pyrites in a calcareo-argillaceous schist, in the county of Cumberland.

It is said, in some late treatises on mineralogy, to be found in Derbyshire; but this mistake has perhaps arisen from the circumstance of its having been wrought into a great variety of beautiful ornaments, as necklaces, lockets, rings, &c. at the manufactory of Brown and Mawe of Derby and Matlock. A variety, but of inferior quality, for the above purposes, has been very lately found at Ashover, in Derbyshire, in cutting a road to the mine works through the upper bed of toad-stone, where it was very abundant in small veins and nodules; and it is a remarkable circumstance, that all the carbonate of lime found in this toad-stone is fibrous; that of the nodules radiating from a centre. It has a considerable resemblance to fibrous gypsum, but may be distinguished from it by its great hardness, and by its being generally traversed by small veins of pyrites. It may be distinguished from zeolite by its greater specific gravity and inferior lustre, and from both the frigid fibrous gypsum, by its off-white, and with salt. Sattin spar is now very rare, the vein being long since exhausted. Analysis by Mr. Pepys:

<table>
<thead>
<tr>
<th>Material</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lime</td>
<td>50.8</td>
</tr>
<tr>
<td>Carbonic acid</td>
<td>47.5</td>
</tr>
<tr>
<td></td>
<td>98.4</td>
</tr>
</tbody>
</table>

2. Stalactite, Kalkfinter of Werner. — Its common colour is white, from which it passes into greyish, greenish, and yellowish-white; from these it passes into the various degrees of yellow, brown, green, blue, &c. deriving its colour from the mineral substances by which it is accompanied.

Dr. Kidd, in his mineralogy, says, that the greenish-white stalactite of Derbyshire owes its colour and peculiar beauty to oxidized carbonic acid. It occurs most commonly massive, also in a variety of external forms, but most often stalactitic. Its surface is generally rough and drusy, and the stalactites are frequently terminated either by a single crystal, or group of crystals, sometimes having the appearance of a crystaliod. Its internal surfaces vary from glimmering to glistening, and is generally pearly. Fracture straight, and feebly diverging fibrous. Fragments mostly indeterminately angular, sometimes splintery and wedge-shaped. It occurs most commonly in concentric lamellar concretions, which are bent in the direction of the external surface. The stalactitic and tuberose varieties are often hollow. It is considerably translucent, in some cases even semi-transparent. Its hardness, fragility, and specific gravity, nearly the same as crystallized carbonate of lime.

It is found in all countries where limedone, particularly of the older formation, abounds. Its localities are too numerous to mention, but in England the most beautiful specimens are found in Cumberland, Durham, Yorkshire, &c. particularly Derbyshire, where it is wrought into various ornaments. It is also used for purposes where very pure lime is wanted, as it is free from many impurities that contaminate common limedone.

The afbalater of the ancients is said to be flàlātīce carbonate of lime, brought from Arabia, and used for the drapery...
Fibrous roots, in Vegetable Physiology, confide entirely of fibres, without any tuberous or bulbous part, except such a common bafis, or point of connection, as is neceffary to hold them together. The fibres, or radicule, are the only effectual part of a root, being what immediately absorbs nourifhment from the foy. They are produced after every year, when vegetation firft awakes from the torpor of winter, and it is only before they firft forth that plants can be removed, or kept for some time out of the ground, in perfect safety. The radical fibres of fuch grafts as grow in loofe fand, are usufally very downy, probably to attach them more firmly to fo flippery a fupport, or to multiply the surface, or points of absorption, in fo meagre a foil.

Grafts and annual plants, in general, have fibrous roots. Such have a natural direétion downwards, and penetrate with facility through the foftest parts of the foy, their extremities chiefly being elongated, or rather formed, as they go. If they grow in water, or a perfectly homogeneous foy, where the refilience is every where equal, the fibres are quite ftraight; but this being fearely ever the cafe in ordinary ground, they assume that contorted and divaricated figure we ufually obferve in all roots.

Some parafitical plants have a peculiar kind of fibrous roots, which attach them to the branches or freams of trees, and therefore are bare on one fide. They may absorb moifure by that fide from the air, perhaps in as great abundance as they derive nourifhment on the other from the tree. See Root.

Fibrous-rooted Plants, in Agriculture, are all thefe which have fine thread-like roots which spread out laterally near the surface of the ground, without flinking very deeply into it. They are diftinguifhed into feveral different sorts from the nature of the roots and the manner in which they grow. See Fibrous Roots and Root.

Fibrous Roots, in Gardening, all fuch as confift principally of fimul filaments or fibres. There are great numbers of plants which have roots of this kind, both of the flower and other decriptions. They are likewife diftinguifhed into different fronds from the nature of the roots: when the roots penetrate downwards in a direct manner, they are determined by particular; when they creep under the furface, horizontal, and creeping; when they are thicker, folijy; when extremely thin, capillary; when they run all the way undivided, simple; when they are divided as fend of smaller roots, branched; and when covered with very fine fhort fibres on the furface, hairy. See Root.

Fibrous Shells, in Natural History, is a name given to certain fojiil shells which have acquired, on account of their breaking abruptly acrofs, and leaving a fibrous or transversely ftriated texture, which occurs their thus breaking short, and being fo brittle, that very few if any of the shells can be obtained whole. A very fingular kind of fuch fibrous shells abounds in certain beds of the chalk flatas, mostly in small fragments; and the fints which interlaven the chalk beds have often, in these cases, their fragments set or imbedded in their folid fubfiance. Often when, fome fints are found among alluvial matter, and broken, the pieces of fibrous shells are decomposed and gone, and a fingular narrow and deep cavity, like a fmall mortife-hole, is fet; a circumflance which moft obervers, in or to the well of chalk dilfrac, cannot fail to have noticed. In the great alluvial mafles of Bedfordshire, at ten or fifteen miles from the edge or ending of the chalk flatas, these fints, with fibrous shells in them, and sometimes large and nearly perfect fibrous shells, are found among the fints and other ruins or fpoils (as Woodward calls it) of the chalk flatas, which is mixed with the chalk of the flatas, superior to the chalk, as should seem from the large Ladius Helmontii and others of its products, which are found mixed in the greatest confusion, through the fubfiance of hills, many miles long, one or two wide, and eighty or one hundred feet high, which are there found, of thefe dilfuall alluvial matters, covering the regular fan and other fints of the dilfrac, and wherein fragments of grey-weathers, the produce of the uppermost and flatas above the chalk, are found, some of them weighing a ton or more.

Fibrous Spars, in Mineralogy, is a variety of calcareous fpar, (carbonate of lime,) found in Derbyshire, and elsewhere, which is often manifefled on the furface, owing probably to hollows in the furface of the fparre or crack which it once filled; the fpar or fpara of this fpar crofs it tranfverfly, and occasion its fudden and fandy fracture, like the fibrous fsh above defcribed. Fibrous fpar is very common in the fparres near the top of the fird or upper edge, as in the entrance cut to Hockley lime-quarry, near Aiton, over town, a quarter of a mile N.E. of Bontal church, in Longstone-edge mine in Longstone, Whednedge mine in Alnover, &c.

Another kind of fibrous calcareous fpar (fpar-plate of lime or gyplan,) is dug at Elvaston, Cheadle, Tutbury, and other places, in or near Derbyshire: it lies in the flatas, the fpar or fpara of which crofs it vertically, and occasion nearly a fimilar fracture in that direétion to that of the fpar and flata above defcribed.

FIBULA, in Anatomy, the fmall bone of the leg.

Fibula, in Natural History, a name given to a class of the echinodermata, which have their mouth in the middle of the fide, and the aperture of the anus on one edge. There are found principally among the fojiil kinds, and fome to have had their shells of the affiliated kind, or compofed of fmall plates joined tranfverfly to one another. Of this class there are two genera, the codinus and diploides.

Fibula, in Surgery, an instrument in use among the ancients, for the closing of gaping wounds.
Celsius speaks of the fibula, as to be used when the wound was so patent as not easily to admit of being sewed. Op. lib. vit. cap. 25. apud fin.

Authors are somewhat at a loss as to the form of the ancient fibula. Guido says there were iron circles, or semi-circles, bent backwards both ways; the hooks whereof, being fastened on both sides to the wound, answered exactly to each other; but as this might have been an insupportable pain to the patient, this description is generally left aside.

Falloppius, Sanctorius, and others, take the word fibula to have signified, in reality, no more than the sewing up of the wound with a needle and thread, as used at this day.

**Fibula, Luxation of.** See Luxation.

**Ficaria**, in Botany, Pleworf, so called by Brunfelsius and other old writers, on account of the fig-like tubercles of the root, which resembling the dises of called the piples, the plant was ingeniously supposed to be a remedy for that complaint. The next step was to affirm it to be so, as we find in such writers, "either applied outwardly, or taken internally." As it is very acid, and even caustic, we cannot recommend a trial.

Hudson established the *Ficaria* as a separate genus from *Ranunculus*, see Fl. Angl. 444, on account of the smaller number of its calyx-leaves, and greater number of its petals; but he has not been followed. *Ranunculus* is too natural a genus to admit of such a separation on artificial principles alone.

**Ficedula**, in Ornithology, a name given to several species of *Metacilla*, (which see.) See also *Turdus* triphilus, *Musciaca* atricapilla, and *Parus* americanus.

**Fichant, Figens**, a French term used in Fortification: thus, a flank fchant, or a line of defence fchant, is a place, whence the shots made do not only raze the opposite face to be defended, but also enter within it.

The word is formed of *ficher*, to lick a thing in.

**Fiche**, in Heraldry. See *Fitchee*.

**Ficiteruolo**, in Geography, a town of Italy, in the department of the Lower Po, on the Po; 13 miles W.N.W. of Ferrara.

**Fichtelberg**, a mountain of Franconia, which extends from the vicinity of Barenth to Eger in Bohemia. It is one of the highest mountains in Germany, and contains in it many deferts, rocks, bogs, and morasses. It takes its name from the great number of pines, with which it is covered; it also has many oaks, beech, elm, and other kinds of trees. The extent in length is 22 English miles, and 16 miles in breadth. The summits have various names: the Oichenhof being reckoned the highest. The lake, called "Fichtelsee," is a cavity of this mountain, called the See Loh, and is remarkable merely as the source of the White Mayn. Other parts of this mountain give rise to the Eger, which runs to the E., and the Sala and Nab flowing to the N. and S.

**Ficinus, Marsilius**, in Biography, a celebrated physician, divine, and philosopher, was born at Florence A.D. 1433. His father being physician to Cosmo de Medici, the son was noticed by that liberal prince; and on the death of his father, Marsilius obtained the same honourable distinction. He studied not only medicine and divinity, but acquired the knowledge of both vocal and instrumental music and could perform upon several instruments. He was profoundly skilled in the Latin, Greek, and other learned languages. Under the patronage of the house of the Medici, he might have acquired not only fame, but wealth; more especially after he had, by taking holy orders, rendered himself capable of holding the valuable preferments in the church, belonging to that illustrious family. But, a total stranger both to covetousness and ambition, Ficinus was content with the appointment of a canonry in the great church of St. Laurentius, in his native city, and some small estates in the vicinity, beloored upon him by his patron. Although now an ecclesiastic, who exercised all the duties of his profession, yet he continued to prosecute physic; the profits from which latter profession he devoted to the use of his nephews and nieces, and other collateral poor branches of his family. The cardinal John de Medici, having been raised to the sovereign pontificate, under the name of Leo X. Ficinus received an acquisition to his fortune. He was appointed professor of philosophy, he became exceeding popular, and his lectures were crowded with students from every country; many of whom, becoming in their turn celebrated, enhanced still higher the professor's fame. He certainly appears to have possessed great merit in the didactic chair, although in his illustrations he adopted the reveries of judicial astrology; but in this he was not flagr? it was a mania that seized most of his contemporaries among the philosophers. He spent much of his time at his country house, Correggio, near Florence, at which agreeable retreat he was visited by numerous friends, who, like him, could relish the refined pleasures of philosophical retirement, and the charms of physical conversation. So respected was he, that Ficinus could number among his friends some of the ablest of mankind, and the most exalted in rank: doctors, philosophers, bishops, cardinals, and even princes; the celebrated patron of every thing great and good, Lorenzo the magnificent, esteemed it an honour to be cloathed in the number. The solitude that he adopted arose from motives of inclination and necessity. Habituallly contemplative, retirement was pleasing; and naturally exceeding delicate, repose from the bustle and cares of public life at times became essential to his existence on earth. Sensible of his infirmity, he endeavoured to preserve his health by means bordering upon ridiculous superstition. He would, it has been observed, charge his calotte, or under cap, six or seven times an hour. All methods, however, proved unavailing, so that he at length fell a victim to a weak constitution, at the age of sixty-six, A.D. 1499. Sweetness of temper, moderation in disputation, and modesty of manners, were features eminently conspicuous in his character; and he was no less distinguished by his extensive learning, that his genuine piety, fave that the former perhaps was too much tingured with the Grecian philosophy, and the latter too strongly shaded with the gloom of superstition.

His works are numerous and diversified; they contain observations upon physical, metaphysical, moral, and religious subjects. Opuscula de Sole & Luna, various translations from the works of Plato, Plotinus, Jamblichus, Proclus, and other Platonists, and the Platonic syllem thus became fashionable in Italy. The translations are not always accurate, and through all a bias is evident in favour of that philosophy. He would seem persuade his readers, the writers of that school must have been believers in divine revelation. His *Theologia Phatonsica* was printed at Florence in 1582; his *Epitole*, in twelve books, at Venice, 1495; and his whole works were collected and published in two volumes, folio, at Bafle, in 1776. Moret, *Grand Dictionnaire Historique*.

**Ficks**, in Rural. Economy, a term signifying to struggle with
with the legs, as a cow in the tie, or a horse in the fetters, &c.

FICTELOW, in Agriculture, is a term which is sometimes applied to the fore-tackle, or carriage which supports the plough-team.

FICOIDEA, in Botany. See Aizoee, species 2d.

FICOIDEE, the 87th natural order in Juciffen's System, or the 5th of his fourteenth class. The name is taken from Ficuidea, applied by Tournefort to the Menzembranthecam of Linnaeus, which is one of this order. The definition of this class is, Cyzadenes two. Flowers polysepalous. Stamps inserted into the calyx, which is of one leaf, superior or inferior, divided more or less deeply. Carpella inserted into the calyx, generally polysepalous, sometimes wanting, rarely monogynous, by a connection, as it were, of several petals into one. Stamps definite or indefinite in number, often distinct, sometimes united by their filaments. German superior, simple or manifold, or rarely inferior and simple. Styles one or many to each germin, sometimes none; stigma entire or divided. Fruit sometimes simple, superior or inferior, of one or many cells; sometimes, but rarely, manifold, superior, each pericarp being of one cell. Sometimes, by abortion, the sexes become separate in different flowers.

The Ficuideal are thus characterized. Calyx of one leaf, inferior or superior, definitely divided. Petals mostly indefinite, inserted into the upper part of the calyx; sometimes wanting, in which case the calyx is coloured within. Stamens more than twelve, often numerous, inserted into the same part; authors oblong, incumbent. German simple, superior or inferior; styles several; stigmas as many. Fruit either a capsule or berry, with as many cells as there are styles, each containing several seeds attached to their inner angle. Embryo incurred, surrounding a farinaeose albumen. Stemon herbaceous or somewhat thrubby. Leaves opposite or alternate, generally fusculent, mostly various in shape. The first section, which has a superior germin, contains Reaumuri, Nitarria, Scenium, Alzoon, and Glans, with Orygia of Furlkall; the second, with an inferior germin, has Menzembranthecam and Tegragoniam. The plants of this natural order are alkalecent, secreting of themselves soda, or soill alkali, independently of soil or situation, though they naturally grow for the most part in maritime places.

FICOIDES. See Menzembranthecam.

FICORONI, Francisco D', in Biography, a learned and celebrated Roman antiquary, author of an excellent treatise on the theatrical masques of the ancient Romans, with engravings from ancient gems, coins, marbles, and bronzes, upon nearly 100 leaves, well executed, and first published at Rome in 1735, 4to. This work is replete with erudition on the subject, and is at once curious, amusing, and instructive. It is peculiarly connected with dancing, satirization, comic verses, and the musical declamation and melody of the ancients. The wide mouth in the form of a shell, says Ficoronit, so common in the ancient masques, served to augment the power of the voice, upon the principle of a speaking-trumpet. "Quella bocca a condughia, che vede in altre mascher, serviva per ingrandire la voce, come succede nelle trombe a proporzione." See MASQUES.

FICTA, Lit. feigned; as Mufica facta, note transposed out of the hexachords to keys that require flats and sharps, used in old times to be thus called. Ficta, f. e.

FICTION. See FABLE.

FICTION of a person in Rhetoric. See PROSOPEIA.

FICTION of Law, Fictio Juris. Fictions are allowed of in law, in several cases, but must be framed according to the rules of law, not what is imaginable in the conceptions of man; and there ought to be equity and possibility in every legal fiction. There are many of these fictions in the civil law; and by some civilians it is said to be an assumption of law upon an untruth for a truth, in something possible to be done, but not done. (Godolphin and Bartol.) The fictions of the connive in a fine is but a fiction in our law; it being an inverted form of conveyance only. (1 Litt. Abr. 612.) And a common recovery is fictio juris, a formal act or declaration, issued without a cause, where a man is directed to cut off an esche tail, remainder, &c. (15 Rep. 42.) The proceedings in ejected men are also grounded on a fiction, or false representation of law, a bond made by a feudal man may be pleaded to be made in the place where made, 42s. 6d. in Flintmgton, in the county of Middlesex, &c. in order to try the same here; without which it cannot be done. (Cor. Litt. 281.) And thus it also is in some other cases; but the law ought not to be satisfied with fictions, where it may be otherwise really satisfied; and fictions in law shall not be carried further than the reasons which introduce them necessarily require. 1 Litt. Abr. 610. 2 Hawk. 325.

FICTIOUS PLAINTIFF, denotes one not in being at all, or who is ignorant of the suit. The offence of suing another in the name of such a plaintiff, if committed in any of the king's superior courts, is left, as a high contempt, to be punished at their discretion. But in courts of a lower degree, where the crime is equally pernicious, but the authority of the judges not equally extensive, it is directed by Stat. 5 Eliz. 2. to be punished by six months' imprisonment, and treble damages to the party injured.

IFICUS, in Botany, an ancient Latin word of uncertain derivation. The Fig-tree. Linn. Gen. 525. Am. Acad. v. 1. 23. Schreb. 746. Vahl. Enum. v. 2. 118. Hoff. 420. Tourn. 1. 422. Curt. t. 91. Mart. Mill. Dist. v. 2. Clas. and order, Dioscoridia Triacidia. Linnaeus placed it in Polygamaia Triacidia, because the Cupricus, or Wild fig as it is called, has entirely male blossoms, while the cultivated figs have on one tree more perfectly male, on another female, flowers. The different structure of the partial calyx in the two flowers, authorizes its being kept in Dioscoridia at least, though Vahl removes it to Triandria Mouyngia. Nat. Ord. Scabridae. Linn. Urtices. Juff.

Gen. Ch. Common Receptacle somewhat globular, flaky, concave, cloaked with several scalefs within the orifice. Its inside is lined entirely with numerous florets; the uppermost, or those nearest the orifice, being males; the rest, more numerous, females; all separately flowered.—Male, Cal. Perianth deeply three-lobed, rarely more, erect, its segments lanceolate, erect, equal. Gen. none. Stam. Thre. leaves three, bristle-shaped, the length of the calyx; authors two-labeled. Pit. a deciduous twinned segment only.—Female, Cal. Perianth inferior, in five deep, lanceolate, pointed, straight, nearly equal segments. Gen. none. Pit. Germen oval, filling the perianth; style aw-shaped, reflexed, lateral; stigma two, pointed, reflexed, unequal. Peric. none, except the perianth enlarged and become papil. Seed one, roundish, compressed. —The male florets are commonly abortive in all the figs of one tree, the female ones on another. Those figs which are entirely male, as above-mentioned, are considered as most essential for propagation, and for constantly improving the fruit of the female trees. Hence the curious history of Capricaman. See that article.


The species of this most natural genus are prodigiously more numerous than Linnaeus had any idea of. This last edition
Ficus.

Section 1. Leaves undivided and entire.
1. F. religiosa. Linnae. Sp. Pl. 1514. (Arculus; Rheed Hort. Mal. v. 1 47. t. 27.) "Leaves ovate or heart-shaped, entire, very long-pointed. Fruit sessile."—Native of the East Indies, where it is treated by the Hindus with superstitious veneration, their God Vishnun having been supposed to be born under it. Christiana calls it the Devil's tree. The leaves are evergreen, smooth and shining, of a fine green, alternate, on long stalks, elegantly pendulous. Fruit the size of a large pea, dry and tadpole-shaped. This tree grows readily in our flaves.

2. F. popolifolia. Vahl. Synth. v. 1 82. t. 22.—"Leaves nearly cordate, acute, Fruit stalked, in pairs."—Native of Arabia, introduced by Forster for the preceding. Fruit-stalks an inch long. Whole plant very smooth.

3. F. Pilafii.—Leaves ovate, somewhat heart-shaped, pointed, very smooth, finely veined. Fruit foliaceous, globose.—Gathered by Dr. Buchanan at Nasin hotty in Nepal, in D. 1802. The Nawars call it Pilafii. It is a tree, generally parasitical. Leaves about three inches long, on stalks one-third their length, resembling the leaves of a Poplar. Fruit smooth, the fize of a black currant.


5. F. nymphaeifolia. Linn. Mant. 395.—"Leaves heart-shaped, roundish, pointed, smooth, glaucous beneath."—Native of the East Indies. Leaves like those of Nymphaea alba in fize and figure, but very glaucous beneath. H. Linn.


7. F. polila. Vahl. Enum. n. 7.—"Leaves ovate, inclining to heart-shaped, pointed, smooth, even, entire."—Found in Guinea by Hert. Leaves two inches or more in length, veryiny. Fruit stalked, smooth, globose, the fize of a hazel-nut.

8. F. Chinn. Forbb. Arab. 219.—"Leaves heart-shaped, rough."—Native of mountains in Arabia, where it is called Chinnas. It resembles F. Sycomorus, n. 85, except in the asperity of its leaves, and like that has an edible fruit. We have specimens gathered by the late sir George Staunton in the island of St. Jago, under the name of Sycomorus, which appear to be the Chinnas.

9. F. cf. palmata. Ait. H. Kew. v. 3 452.—"Leaves ovate, heart-shaped, with a deep narrow sinus; entire, smooth, acute, green on both sides."—East Indies.


11. F. legginga. Vahl. Enum. n. 10. —"Leaves ovate-oblong, somewhat heart-shaped, pointed. Fruit lateral and axillary, stalked, in pairs."—Gathered by Mr. Ryan in the island of Montserrat. Leaves thin, three or four inches long, veiny. Fruit the fize of a pea, with a minute calyx under.

12. F. sebra. Forbb. Prod. 746.—"Leaves ovate, somewhat heart-shaped, oblong, rough beneath. Fruit top-shaped, without a calyx."—From by Forber at Tanna and Namoka. Leaves half a foot long, remotely toothed; roughish above; rough, paler, slightly downy beneath. Vahl.

13. F. citrifolia. Lamarck. Dier. v. 2 404. (Plum. Ind. t. 131 f. 2.)—"Leaves oval, somewhat heart-shaped, sharpish, entire, ribbed, smooth on both sides. Fruit globose, foliary, stalked, axillary."—Salt Indies. Cultivated in the Paris garden. Leaves more heart-shaped at the base than Plumier represents them. Figs bigger than a walnut, green, white within, almost tadpole-shaped. Lamarck.


15. F. scandens. Lamarck. Dier. v. 2 453. (F. stipulata; Ait. H. Kew. v. 3 452.) Leaves heart-shaped, unequal at the base, smooth, reticulated with veins beneath. Stipulas acute. Branches thread-shaped, creeping.—This is supposd to be a native of the warmer parts of America. It is common in the European flaves. The fume creep up the walls, and throw out numerous, alternate, subdivided, slender, leafy, downy branches, making an elegant evergreen tapestry. Leaves alternate, on very short downy stalks, heart-shaped, obtuse, entire, unequal at the base, dark shining green, smooth, reticulated with pinnate veins beneath. Stipulas inerfolaceous, in pairs, as long or longer than the footstalk, brown, membraneous, ovate, pointed. It has never fruited in England or France, but we have received from the flaves in the royal gardens near Lisbon, by favour of Mr. Correa, branches laden with fruit, of a top-shaped form, purple, nearly as big as common figs, but infix, which were positively ascertained to be produced by the plant in question. These branches moreover are thick, firm, and straight, furrowed, bearing leaves ten times as large as those above described, quite coriaceous, exactly ovate or elliptical, equal at the base, exquisitely reticulated with prominent veins beneath, and punctuated between them, as well as a little hairy. The whole, in short, of these speciments accords with F. puniutta, n. 46, hereafter described, and nothing but our perfect confidence in our correspondent's accuracy could induce us to believe there were not some mistake. Lamarck mentions Mr. Correa's information, but had seen no speciments.

16. F. stipulata. Thumb. Diff. 8. —"Leaves heart-shaped, unequal at the base, reticulated with hairy veins beneath. Stipulas acute. Branches round, decumbent.—Native of Japan. Thumb. China. Herb. Linn. The branches are decumbent and creeping, compound, round, minutely downy, reddish brown, often scaly with the permanent stipulas after the leaves are fallen. Leaves much like the leaf, but the veins at the back are stronger, more crowded, and more curiously reticulated, as well as roughish or hairy. Stipulas like the former. Fruit unknown. We are inclined to think it this he differ from the last, of which there is some question, that F. puniutta may be this in a perfect state. —We have other speciments of creeping kinds, which perhaps undergo a similar metamorphosis when they fructify, and
and which ought to teach botanists caution in defining the species of this genus.

17. F. foetida. Vald. En. n. 16. — "Leaves heart-shaped, oblong, acute, rough on both sides. Stem creeping." — Native of Java, where it runs up trees. Herb. Linn. Stem creeping, by roots opposite to each leaf, downy when young. Leaves alternate, two or three inches long, heart-shaped, equal at the base, entire, acute, roughish to the touch, dotted beneath. Fruit stalks downy, near half an inch long. *Sigillus* lanceolate. Our description will be found to differ a little from Vald.'s, but not materially.

18. F. pedunculata. Ait. H. Kew. v. 3. 420. (F. arbor americana, &c. Pluk. Alm. t. 178. f. 4.) "Leaves ovate-oblong, heart-shaped, acute, smooth. Fruit globose, on long twin stalks."—Native of America and the West Indies. Jacquin first sent it to Europe from Martinique, and it was long kept in the gardens for *F. indica. Leaves* from three to six inches long, and one or two broad, smooth; paler and opaque beneath. *Fruit* the size of a pea.

19. F. menzies. Ait. H. Kew. v. 3. 451. (Tsjakela; Rhodee H. Mal. v. 5. 87. t. 69.) — "Leaves ovate, somewhat heart-shaped, acute, smooth, with impressed dots below. Fruit large, globose."—Native of the East Indies. *Leaves* are a span long, two or three inches broad, on long stalks. *Fruit* the size of pepper-corns.

20. F. radicans. Leaves lanceolate, acute, smooth. Fruit in radical clusters.—Gathered by Dr. Buchanan in the East Indies, probably in the Myfory country. Stem shrubby, branched, smooth. Leaves crowded, three or four inches long, scarcely one broad, pointed, paler beneath, minutely dotted, but not rough to the touch. Fruit stalks scarcely an inch long. *Sigillus* longer, lanceolate, deciduous. *Fruit* in clusters from the root.

21. F. neriifolia. Leaves elliptic-lanceolate, pointed, smooth, with parallel veins. Fruit top-shaped, sessile, finely furrowed.—Gathered in Feb. 1805 at Narain betty in Nepal, by Dr. Buchanan. It is called there *Dud Cbuffi*. Stem arborescent. *Branches* furrowed, smooth. Leaves yellowish green, about three inches long, with narrow parallel lines, and numerous parallel, transverse veins. Fruit stalks furrowed, hardly an inch long. Fruit solitary or in pairs, of a hard nut, perhaps larger when ripe of the Guiana.—A tall tree. Leaves from four to eight inches long, coriaceous, with white ribs, and fine reticulations. *Fruit* axillary, scarcely so big as a cherry, yellow, chesnut-coloured when ripe.

23. F. ovata. Ibid. n. 20. — "Leaves ovate-oblong. Fruit sessile, in pairs. Common calyx hood-shaped, deciduous; that of the fruit torn into two parts."—Gathered by Thoning in Guiana. A tall tree, with somewhat whorled branches, often rooting. Leaves from five to eight inches long, rather leathery, with white ribs. Young fruit covered with a soft hairy, cut round at the base as the fruit swells, and deciduous. *Figs* the size of plums, inclining to ovate.


25. F. Granatum. Forst. Pl. Eschul. 37. — "Leaves ovate, entire. Fruit stalks terminal, in pairs, horizontally divaricated. Fruit globose, with a calyx."—Native of the life of Tanna, where it is also cultivated for the sake of the fruit, which is sweetish, but watery and rather thin, larger than common figs, red with yellow spots, and slightly downy; internally purple, soft and pulpy. The tree is tall, with an angular rough trunk, and long ascending branches. Leaves a span long, smooth, dark green above, with a few yellow veins; brighter underneath. *Fruit* on short thick stalks, from the blosom of the uppermost leaves. *Lunds* terminal, sharp-pointed, clothed with brown hairs. *Fecum*.


27. F. Taba. Forst. Arb. 219. — "Leaves in pairs, flaked, ovate, entire."—Gathered by Forstall at Zebul in Arabia, where it is called Taba. The leaves are four inches long. No other botanist appears to have seen this species.

28. F. Ampelos. Burm. Ind. 226. Linn. Dict. v. 2. 496. (Folium politum, Ampelops; Rumph. Amb. v. 4. 184. t. 63. Teregam; Rhodee H. Mal. v. 3. 77. t. 59.) — "Leaves ovate, acute, rough. Fruit solitary, flaked, rough, with an open scaly mouth."—Native of Malabar. The branches, *fruit stalks* and leaves are extremely rough, with minute cartilaginous points; the latter are about a span long, three-ribbed, but the lateral ribs are short, and run into thin transverse veins, as Rumphius describes them. His synonym appears to us more certain than that of Rhodee, whole leaves are too small, and fruit not like our specimens. The latter may possibly be *F. pericarpia* of Loureiro, quoted by Vahl under *Ampelos*, as that is laid to have small leaves. The fruit in our's is like a small gooseberry, rough, the mouth beft with numerous prominent, recurved scales. *Fruit stalks* axillary, filaments recurved, with ribs, half an inch long. The leaves are said to be very useful for polishing fine cabinet work, or toys, of wood, ivory, or coral. They are not, however, to fine a file as Dutch rubres, *Taxifilum bu runners*. The Abricours name, as made into Greek by Burmann, only tends to deceive.

29. F. fisurifera. Burm. Ind. 226. (Itty-alu; Rhodee H. Mal. v. 1. 45. t. 26, according to Vald.) — "Leaves ovate, pointed, fringed."—Native of Japan. *Fruit* East Indies, according to Juffieu's herbarium. *Vall.* The latter describes the leaf quite smooth, two inches long. *Fruit* globose, rather bigger than a pea, rough with elevated points. *Fruit stalks* very short. It seems not certain that Vahl and Burmann mean the same plant, and the former copies the *same* synonym of Rhodee, after Linnaeus, for *F. benjaminia* in his next paragraph.

parts of the East Indies. It forms a tall tree, with innumerable, slender, zigzag, leafy branches, with a rugged bark. Leaves an inch or inch and half long, flaked, exactly ovate, with an elongated point, entire, very smooth and shining, dilated by numerous, transverse, straight, parallel veins, which do not reach the edge. The fruit is axillary, solitary, on a stalk a quarter of an inch long, bearing two or three small round scales about the middle, and several more under the fruit, which, in the very early state now before us, is the site of multiform, smooth, crowned with two or three long projecting scales from its mouth, to like frugus, that if we had not the function of the moss able botanists, we should have great doubt of this being a Ficus.

31. F. infrasolitana. Buch. MSS.—Leaves ovate-oblong, taper-pointed, entire, smooth. Fruit below the leaves, scattered, flaked, globose.—Gathered by Dr. Buchanan in March 1803, by the way side at Lohair in Nepal. This tree has the aspect of F. religiosa. Leaves deciduous, about three inches long, and above one broad, with several parallel transverse veins, and innumerable reticulated ones between them. Fruitstalks an inch or inch and half long, smooth, channelled. Stipulas downy, deciduous. Fruit from about the top of the last year's shoots, globose, smooth, the size of a gooseberry, on short thick stalks, mottily tinctuate.

32. F. macrophylla. Roxb. and Buch. MSS.—Leaves roundish-ovate, pointed, five-ribbed at the base; smooth above; finely downy beneath. Native of the East Indies. Young branches, stipules and fruitstalks downy, as well as the back of the leaves, which are eight or ten inches long and fix or eight broad, wavy at the edge, paler beneath, reticulated with innumerable transverse rectangular veins.

33. F. bengalensis. Linn. Sp. Pl. 1514. Trew. Enl. t. 59. (Pereira; Rheed. H. Mal. v. t. 49. t. 28.)—Leaves ovate-oblong, obtuse, smooth above; somewhat downy beneath; ribs radiating from above the base. Fruit globose, softly, crowded.—Frequent in the East Indies. A tall and stout tree. Leaves coriaceous, rather elliptical, four or five inches long, minutely downy beneath, their five ribs meeting a little way above the base. Fruit generally in pairs or crowded, as large as a bullace plum, red, downy, encompassed with a broad calyx, of several downy leaves, at the base. Our specimen from the Hirta Chloriflorus agrees with one sent by Dr. Roxburgh from Bengal. In both the leaves are decidedly downy beneath, though described as smooth. We have also from Dr. Roxburgh what seems a variety, with rather narrower leaves, very downy beneath, and fruit no higher than peas, equally downy, generally in pairs, and very abundant.

34. F. rubiginosa. Ventenat Jard. de la Malmaison. t. 113. —Leaves elliptical obtuse; smooth above; downy and rubly beneath. Fruit globose, nearly flask. Calyx downy, almost as long as the fruit. —Native of New Holland. Cultivated in the greenhouse at Kew, where it fruits about midsummer. So abundant, with rich downy branches. Leaves three or four inches long, and two broad, coriaceous, evergreen, flaked, clothed beneath, especially when young, with soft, dark, rubly, purplish down, and furnished with numerous transverse parallel veins, of which the lowermost do not grow in a radiating manner like the last species. Fruit axillary, solitary, the size of a floce, reddish, dotted, enveloped, till half grown, in the brown downy calyx.

35. F. callosa. Willd. Diff. 25. t. 4. Vahl. Enum. n. 29.—"Leaves oblong, obtuse, narrower at the base, with two callous dots; rough beneath." —Native of the East Indies. Leaves smooth and shining above, paler beneath. Fruit globose, umbilicated, the size of a cherry. Wildman.


38. F. racemosa. Linn. Sp. Pl. 1515. (Attia; Rheede H. Mal. v. t. 43. t. 25.)—"Leaves elliptic-ovate, acute, dotted on the upper side. Fruit febilis, top flapped, downy." Vahl. Native of the East Indies, in Sandy soil. A tall and spreading tree. Branches downy in the upper part. Leaves flaked, remote, two or three inches long, narrowed at each end, especially the upper, acute, flitted, in a manner, with ribs, somewhat venous, smooth on both sides, dotted on the upper when examined with a microscope. Fruit stalks rather downy. Fruit pear-shaped, flaked, downy. Vahl.—We know this only by the above authorities, having no authentic specimen. The fruit is not febilis in Hort. Malab.

39. F. glomerata. Roxb. Corom. v. 2. 14. t. 123.—Leaves elliptic-ovate, acute, not dotted above; minutely granulated beneath. Fruit clustered, flaked, top-flapped, downy. Generally found near villages, and about rivers and water-courses in Bengal, where the soil is rich and moist. Fruit eaten by the natives, but Dr. Roxburgh thought it disagreeable; purplish, the size of a pigeon's egg, growing many together on the young branches, each on one stalk. Leaves four or five inches long, smooth above; feeling roughish beneath.

41. F. indica. Linn. Sp. Pl. 1514 e. Lamarcck. Diff. v. 2. 394. Cluf. Exot. 1. (F. cotonefolia; Vahl. Enl. n. 34. Catu-alus; Rheede H. Mal. v. t. 73. t. 57.)—"Leaves ovato-lanceolate, coriaceous, downy beneath. Fruit febilis. Branches taking root at the extremity."—Native of the East Indies, where it has been celebrated from the most remote antiquity, for its property of letting its branches droop and take root, so extending itself by that means, that a single tree forms a curiously-arched grove. We cannot therefore approve of Professor Vahl's innovation, in transferring its ancient name to another, which Linnaeus thought a variety, but which is totally distinct. See our note. These leaves are three or four inches long, pointed. Fruit globular, the size of a large gooseberry, reddish, sweet, but not pleasant-tasting.

42. F. Toba. Forck. Arab. 219.—"Leaves two-ranked, rough, ovate, acute, entire, alternate, flaked."—Found by Forckall in Arabia, where it is called Toba, which is all we know concerning it.

43. F. santriata. Thumb. Diff. 9.—"Leaves oblong, emarginate, smooth, dotted beneath. Stem zig-zag, throwing out roots."—Native of the East Indies. Stem parasitical, creeping to a great extent, round, rugged, brown, hardly to thick as a goose-quill, branchless; the ultimate divisions very short. Leaves obtuse, only from half an inch
FICUS.

... to an inch long, spreading or reflected, their margin entire, a little reflexed. **Footstalks** very short. Fruit obovate, almost as large as the common *F. carica* Linn. — We suspect this ought to be placed near *ficus* n. 15, but we are unwilling to disturb Vahl's arrangement. It seems by analogy to confirm the report there given of the fruit of that species.

44. *F. peruviana*. Linn. Suppl. 442; excluding the synonym. — Leaves elliptical, pointed, very smooth. Fruit globose, umblicated, flaked, axillary, in pairs. *Calyx* in two lobes. — Native of Surinam. Whole plant smooth. *Leaves* two or three inches long and one broad, taper-pointed, with fine transverse veins. **Footstalks** half an inch long. **Fruit** the size of a pepper-corn, on a stalk nearly its own length. *Calyx* small, in two deep, recurved segments. Vahl describes the fruit in clusters an inch long, which is altogether unfounded. He also copies from the **Suppl. Plantis** an erroneous synonym of Plummer, t. 132. f. 3, which he had just before similarly applied to *F. americana*.

45. *F. xanthocarpa*. Buch. MSS. — Leaves ovate-oblong, pointed; smooth above; downy and glaucous beneath. Fruit solitary, axillary, ovate, hairy, on flaks as long as the footstalks. Stem trailing. — Gathered, in May 1862, by Dr. Buchanan, in the woods of Upper Nepal, where this and others of its genus are called *Swieflis*. — Stem trailing, milky, as thick as the thumb, branching out, at the top of the tree that supports it, into many spreading, alternate, downy, leafy shoots. *Leaves* about three inches long, reflexed at the margin, very veiny, three-ribbed at the base; their under side whitish, downy, finely reticulated. **Footstalks** half an inch or more in length, hairy. **Footstalks** rather larger. Young **fruit** the size of a hazel-nut, somewhat angular, oblong, very hairy. *Calyx* very small, and a little remote, of three hairy leaves.

46. *F. rumblidis*. Linn. Sp. Pl. 1515, but not SYST. VEG. ed. 14. 922. (F. sylvester procedens, folio liripeti; Kempt. Amea. 803. t. 804.) — Leaves ovate, smooth, very closely reticulated beneath. Stem jointed, creeping. Fruit flaked, nearly as long as the leaves. — The only certain knowledge we have of this Fig. 3 from Kempter, who describes it as running up walls and rocks in Japan, the branches being marked with annular contractions. *Leaves* evergreen, scattered, flaked, about two or three inches long, hard, rigid, exactly ovate, but pointed; smooth and of a rather shining green above; paler, opaque, and most beautifully reticulated with prominent veins beneath, so crowded that there is scarcely room for the point of a needle between them. **Fruit** terebent, on thick, short, recurved, axillary, foliary stalks, the size and shape of a walnut with its coat on, or else pear-shaped, or turbinato with a taper base, hardish, rugged, generally green with a blue bloom, sprinkled with white dots. Nothing can much better accord with the specimens sent us from Portugal than the fruit of *F. scindens*, n. 15. Thunberg's description is still more precise, as he says the leaves are obtuse, and branches furrowed. We have been no authentic specimens of *F. rumblidis*. Linnæus altered the specific character, and added a description, in his *Systema Vegetabilium*, from a widely different plant in his herbarium, the *eritx* of Thunberg; see n. 59.

47. *F. Calabur*. Buch. MSS. — Leaves oblong-obovate, taper-pointed, smooth; very closely reticulated beneath. Fruit flaked, axillary, solitary, globose, hairy. — Native of woods in Nepal, where it is called *Calabur*. Stem bluntish, three or four feet high. **Branches** downy. *Leaves* alternate, four or five inches long, somewhat revolute; very smooth above; whitish and reticulated, like the leaf, beneath. **Footstalks** and **fruitstalks** each about half an inch long, thickish, hairy. **Fruit** the size of a moderate gooseberry, globular, pointed, hairy, slightly ribbed.

48. *F. reflexa*. Tomb. Diff. t. 11. — Leaves elliptical, of life, smooth. Branches recurved. Fruit globular, fleshy. — Native of the East Indies. **Branches** bristled, rugose, sin-coloured, smooth. *Leaves* somewhat obovate, a finger's length, with parallel ribs (or rather veins). **Footstalks** half as long as the leaves. **Fruit** fleshy on the branches, either scattered or crowded, smooth, the size of a pea. *Thunb.*

49. *F. trifida*. Linn. Suppl. 441. (F. folio citri obtuso, fructu sinuoso; Plum. t. 123. t. 132. f. 1.) — Leaves elliptical, smooth, five-ribbed at the base; ribs hairy. Fruit globose, foliary, axillary, flaked; mouth with a triangular border. — Communicated to Linnæus from Surinam. The **branches** are slightly hairy about the extremities only. *Leaves* alternate, three or four inches long, on very hairy footstalks not an inch in length; both sides are smooth and even; the upper minutely dotted; the under scarcely perceptibly reticulated with veins, but furnished with a strong mid-rib, several very straight, parallel, transverse ribs, and at least two radiating ones, on each side, at the base, all hairy. **Fruit** the size of a black currant, on a short thick hairy stalk, minutely downy, with an oblique variously divided calyx, externally hairy, beneath it, and a singular triangular elevated border round the mouth, which is closed. Plummer's figure seems to agree tolerably well, but there is no certainty in his synonym.

50. *F. nitida*. Thunb. Diff. t. 10. (F. microcarpa; Linn. Suppl. 442. Ititi-aracalou; RheeHe H. Mal. v. 3. 69. t. 55.) — Leaves elliptical, bluntly-pointed, somewhat unequal, smooth, with numerous parallel veins. Fruit fleshy, globose, flattened at the top. — Native of the East Indies. Whole plant smooth. *Leaves* two or three inches long, usually oblique or inequilateral, near two inches broad, with a short blunt point; transverse ribs or veins very slender, terminating in one radiating vein within the margin, as in many other species. **Fruit** the size of a pea, enveloped till half grown, in a strong three-clawed calyx; its mouth is always closed with scales folded over each other. — The **footstalks** are short and thick. Vahl overlooked the Linnean synonym, and Lamarck could not ascertain.

51. *F. schleichera*. — Leaves elliptic-oblanceolate, unequal, acute, roughish on both sides. Fruit axillary, flaked, in pairs, globose, rough. — Native of the East Indies, where the leaves are used for polishing ivory, being a very fine file. Every part of the plant is rough with most minute cartilaginous points, hardly perceptible but by the touch. *Leaves* two or three inches long, of a light green, on stalks half an inch long. **Fruit** the size of red currants, with a timid, slightly perforated, mouth. We have some doubt whether Vahl's *roombdulidis*, hereafter mentioned, n. 56, be different from this.

52. *F. composita*. Roxb. Corom. v. 2. 14. t. 125. — Leaves elliptical, pointed, smooth, with numerous transverse veins. Fruit fleshy, in pairs, roundish, with a triangular mouth. — Found by Dr. Roxburgh on the Ceylon mountains. It is called among the Telangas Poota, or Pudda, Jure. A large tree, with flender, often pendulous, branches. *Leaves* two or three inches long, and half as broad; their lateral veins straight and parallel, having numerous reticulations between them. **Footstalks** near an inch long, and rather flender, very different from those of *niitida*, n. 52. **Fruit** when ripe the size of a moderate gooseberry, first purple, then orange.

54. F. aggregata. Vahl. En. n. 43. (V. pandata; Lam. Dict. v. 2. 495.)—"Leaves oblong, obtuse, smooth; dotted on the upper side. Fruit globose, aggregate, feffile."—Gathered by Commeron in the Mauritius, from whose specimens Lamark described it. 

Leaves two inches long, one and a half broad, flaked. Fruit about the tops of the small branches. We know this species only by the above description.

55. F. pulchra. Lam. Dict. v. 2. 520. Vahl. En. n. 44. 

—Leaves elliptic-oblong, with a blunt point, rough with hooked spines. Fruit globose, thick, axillary, solitary, rough.

—Gathered in Madagascar by Commeron, one of whose specimens is before us. 

Leaves about two and a half inches long, scarcely one broad, obtuse, with a little broad obtuse point; pater beneath, with largely reticulated veins; both sides flakey, especially the veins beneath and the edges, are rough with minute white, hooked, rigid prickles; as are the footstalks, fruitstalks, upper part of the branches, and the fruit itself, which is rather larger than a black currant, and purple.


—"Leaves oblong, downy beneath. Fruit axillary, feffile, foliary, downy." Vahl. 

Native of the East Indies. 

Branches round, downy. Leaves two inches long; smooth above; velvety beneath, rather flat; obtuse on downy footstalks, shorter than the leaves. Fruit very small.

Ed. Sciss. Lam. En. n. 66. (V. lepida; Forl. Prod. 76.) 

—Leaves oblong, oblong-ovate, pointed, fruitstalks in pairs, with a small calyx at the top. Fruit warty. Forl. 

Found in the island of Tanna.

57. F. coriacea. Ait. H. Kew. v. 3. 453. 

—"Leaves oblong, smooth, coriaceous; attenuated and heart-shaped at the base; veins faneck."—Grows in the East Indies.


Fruit top-shaped, thick, axillary, solitary, smooth. 

Found in Japan. Stem weak, not perfectly decumbent, round, flitted, smooth. 

Branches scattered or aggregate, erect, straight, leafy. Leaves from two to four inches long, green, and often minutely bristly, above; pale, and reticulated with numerous downy veins, beneath. Footstalks half an inch or more in length, rather downy upwards. Fruitstalks rather longer, erect, with a three-leaved calyx at the top. Fruit the size of a hazel-nut, rather tapering at the base, sweet and eatable.


—"Leaves oblong, fiddle-shaped, smooth. Stem thread-shaped, creeping."—Native of Java. Leaves obtuse, with one side narrower than the other, about an inch long, very finely veined, pale beneath, on very short footstalks. Stem and branches slender, zigzag, brown. This seems to be akin to n. 15 and 16, next to which Thunberg has placed it, and we know not why Vahl, who appears to have seen specimens of the fulvata at least, has removed it to so great a distance.


—"Leaves oblong, pointed, smooth. Fruit ovate, rugged, feffile."—Native of the East Indies. 

Branches round, narrowed, smooth. 

Leaves coriaceous, four inches long, ribbed; green above; 

af-coloured beneath, on thick stalks about half an inch long. Fruit towards the ends of the branches, smooth, as big as plums. Thumb.

62. F. retusa. Linn. Mant. 129.—Leaves oblong, obtuse, very obtuse, quite smooth; three-ribbed near the base. Fruit feffile, globose, smooth. 

Calyx downy. Native of Java. 

Branches smooth, angular. Leaves three inches long, flaked; shining above; opaque, paler and veiny beneath; furnished with a ftraight lateral rib on each side, which vanishes about the middle of the leaf, and several transverse ribs before the fruit. When young, enveloped in a calyx which is externally downy; when full grown the size of a currant, smooth, with broad polished scales at the mouth.


—"Leaves lanceolate-oblong, pointed, dotted beneath. Fruit mostly in pairs, globose, axillary, on wavy smooth footstalks."—Native of the Society Isles. 

Branches smooth. Leaves flaked, three or four inches long, an inch or more in breadth, with very fine nerves, febile, veined, membranous. Fruit the size of a pea, on very short footstalks. Vahl. 

64. F. laurifolia. Lam. Dict. v. 2. 495. Vahl. En. n. 53. (F. virescens; Ait. H. Kew. v. 3. 451.) 

F. indica maxim. folio oblongo, funicularis e funnis ramis deminis radicibus agentibus fe propagatis, fructu minore, fpheroicas, fanguineas; Sloane Jan. v. 2. 142. t. 223.) 

—Leaves oblong-lanceolate, smooth, with a few scattered depressed points above. Fruit feffile, foliary, globose, axillary."—Native of the West Indies. A very lofty tree, according to Sloane, whose upper branches throw out long roots. 

Polynesian of all kinds are fond of the fruit, which is of the size of a hazel-nut, scarlet, sweet, and not unpleasant. The leaves seem to resemble those of the Cherry-laurel.


—"Smooth. Leaves oblong, obtuse, narrowed at the base. Fruit feffile, nearly foliary."—Described by Vahl from Juffieu's herbarium. Its native country is unknown. The branches, according to him, are grey in the upper part. Leaves flaked, three or four inches long, paler beneath, very smooth. Footstalks an inch long. Fruit globose, grey, twice as big as a pea. 

Stipulas lanceolate, attenuated, smooth, as long as the nail. 

66. F. pallida. Ibid. n. 55. 

—"Leaves oblong, somewhat wedge-shaped, smooth, even, obtuse. Fruit axillary, in pairs, on short footstalks."—Gathered by Von Rohr at St. Martha, in South America. Branches greyish. Leaves membranous, two or three inches long, and one broad, bright green, minutely veined, with a yellow rib. 

Footstalks slender, smooth, an inch long. Fruit globular, smooth, the size of black pepper. Vahl.

67. F. extensa. Ibid. n. 56. (Ait. H. Kew. v. 3. 375. t. 58.) 

—Leaves lanceolate, fome obscurely elliptical, acute at one side, and narrower on the other side; at the base. 

Fruit flaked, globose. 

—Native of the East Indies. Branches and leaves smooth; the latter three or four inches long, most veiny beneath, on short footstalks. 

Fruit in pairs, axillary, smooth and even, the size of a pea, on footstalks longer than those of the leaves. Vahl.

68. F. amphisma. (F. indica; Vahl. En. n. 57. F. indica b; Linn. Sp. Pl. 1514. Tejela; Rheed. H. Mal. v. 3. 85. t. 63.) 

—"Leaves broad-lanceolate, long-pointed, smooth. Fruit chaffier, globose, smooth, on short footstalks."—Native of the East Indies. This, according to Rheed, is a tree of vast dimensions, about 70 feet high, and 18 in the circumference of the trunk, with widely-spread branches. 

Leaves flaked; two or three inches long, with numerous, parallel,
parallel, transverse, slender ribs; the point sometimes an inch long. Fruit copious, the size of a pea, inbipid, the food of bats, on which account the Portuguese and Dutch call it the Bat-tree.

69. F. deltisfolia. Vahl. Symb. p. 182, t. 23. (F. indica; Forb. Fl. Arab. 179.)—"Leaves lanceolate, pointed, smooth. Fruit axillary, stalked, in pairs."—Gathered by Forstkall in Arabia, where it is called "Dhab." Of the bark, dried and twisted, matches for great guns are made. The branches, though long and pendulous, do not throw out roots. The whole plant is very smooth. Leaves flaked, from three to five inches long, rounded at the base, dotted beneath, not above an inch broad. Fruit larger than a pea, smooth.

70. F. obliqua. Forbl. Prod. 77.—"Leaves lanceolate, very smooth, with a cartilaginous edge. Fruit-flacks in pairs, very short. Calyx as long as the fruit, deciduous." Forl. A native of the South Sea Islands of Nanoka and Tanna.

Section 2. Leaves undivided, serrated, or toothed.

71. F. semicordata. Buch. MSS.—Leaves half-heart-shaped, slightly serrated, rough; rather hairy beneath. Fruit on wide, flat foot-flacks, stalked in pairs. Hedges in Upnag and Lower Nepal, where it was found by Dr. Buchanan, early in 1822. A large tree, with downy or hairy branches. Leaves above a foot in length, oblong, sharp-pointed, very unequally heart-shaped at the base, paler and veiny beneath, on short, rough, or downy foot-flacks, the larger leaf crossing the branch, and furnished with radiating ribs. Stipulae long, narrow, smooth, deciduous. Flowering branches from the base of the trunk, or even from the roots under ground, drooping, panicked, downy, sometimes leafy towards the extremity. Fruit in pairs from each joint of these branches, globose, hairy, on hairy or downy flacks, with a pair of downy bracteas; when ripe as large as a common plum. The natives eat the figs raw, as well as fried.

72. F. auriculata. Lour. Cochinch. 666.—"Leaves heart-shaped, pointed, somewhat serrated, downy. Fruit auricled, smooth, in terminal clusters."—Cultivated, and probably wild also, in Cochinchina, where the moripe figs are flicid and eaten in balads, instead of cucumbers, which they resemble in flavor. The tree is large, with ample leaves. Fruit turbinate, two inches long, red, in dense, upright, terminal clusters, furnished at its top, besides the usual orifice, with four diametral holes, surrounded with a prominent cartilage, and resembling cars.


74. F. mauritiana. Lam. Dict. v. 2. 499. Vahl. En. n. 62.—"Leaves ovate or heart-shaped, serrated; downy and rough beneath. Fruit globose, somewhat turbinate, flaked, on naked pendulous branches."—Gathered by Commodor in the Isle de Bourbon. Branches, downy, rather bipid. Leaves smooth on the upper side, flat, or less than four inches long, four or five broad, ovate, generally heart-shaped at the base, on foot-flacks two or three inches in length. Fruit larger than a walnut, in pairs. Vahl says, the figure in Hort. Mal. v. 3. t. 67, does not ill accord with this plant. See F. symphylodora, n. 82.

75. F. latiflora. Vahl. En. n. 63. (F. morifolia; Lam. Dict. v. 2. 499.)—"Leaves ovate, somewhat heart-shaped, acute, serrated, smooth. Fruit globose, flaked, below the leaves."—Gathered by Commodor in the Isle de Bourbon. Branches brownish. Leaves resembling those of a mulberry-tree, flaked, green on both sides, scarcely at all rough, about three inches long and wide. Fruit smooth, felted over the naked part of the branches.

76. F. tiliifolia. Lam. Dict. v. 2. 499. Vahl En. n. 64.—"Leaves ovate, sparingly toothed, pointed, unequal at each end, rough on both sides."—Native of Java, and the Philippine islands. Branches, round, rough. Leaves two or three inches long, ovate-oblong, very rough with little tubercles, terminating in a point as an inch long, wavy at their edges, sometimes three-crested, or somewhat pinnatifid. Fruit globose, very rough, rather bigger than a pea, on flalls half the length of the leaf-flacks.


78. F. flacciflora. Burman Ind. 227.—"Leaves flaked, ovate; entire at the base; serrated at the top; yellowish underneath."—Found by Goron at Saramon. The fruit is yellow, resembling a gooseberry, but poisonous. Such is Burman's account, who considers Hort. Mal. v. 3. t. 62. as a variety of this, differing only in having shorter foot-flacks. See F. rufescens, n. 122.

79. F. exasperata. Vahl. En. n. 67. (F. seabra; Willd. Diff. t. 2. Vahl.)—"Leaves oblong-ovate, very rough, pointed, toothed towards the end. Fruit flaked, globose."—Branches rough when young, afterwards smooth. Leaves three inches long, flaked, three-ribbed, downy beneath. Fruit in pairs, rough, the size of a pea, on flalls an inch long.

80. F. symphylodora. Lam. Dict. v. 2. 492. Vahl. En. n. 68.—(Perin-teregam; Rheed H. Mal. v. 3. 81. t. 61?)—"Leaves ovate-oblong, acute, minutely toothed; rough on both sides. Fruit hairy, flaked, somewhat whorled, in long clusters."—Native of Java, and other parts of the East Indies. Lamarch described it from Sonnerat's specimen, and remarks, that the figure in the Hortus Malsbaricus would be tolerably exact, if the leaves were represented without the barks. The leaves are about three inches long, somewhat flaked, with hairy ribs. Fruit globose. Vahl describes the fruit iselible, the size of a cherry. Rheed's plant is a very large long lived tree, laden with fruit, as well as leaves, all the year long.

81. F. maculata. Linnae Sp. Pl. 1515. (F. caffinaria folia, fructu globose mucato; Plante, in 1212. 131. f. 1.)—Leaves oblong, pointed, serrated. Fruit globose, fleshy, in long spikes. Native of America. Plumer's figure, whence the above characters are taken, is our only authority for this species. The fruit is an inch in diameter, besprinkled with spots or warts. Leaves a foot long, regularly and sharply serrated, with innumerable straight, parallel, transverse veins.

82. F. hispida. Linnae Suppl. 443. Thunb. Diff. 13.—Leaves elliptic-oblong, pointed, obscurely serrated, rough on both sides. Fruit turbinate, flaked, axillary, solitary, very brilly. Native of Java. The branches and foot-flacks are nearly smooth, the latter two inches or an inch and quarter long. Leaves near four inches long, rough with minute points, furnished with several unequal, curved, brilly, lateral ribs, and reticulated veins; the edges waved, but feebly serrated. Foot-flacks full half an inch long, covered, like the fruit itself, with numerous rigid, shining, tumid brillies.
Had we not one of Thunberg’s own specimens, we should hardly have recognized the plant by his description.

85. F. oppossimolia. Roxb. Corom. v. 24, t. 124. (F. Daemonum; Vahl. En. n. 71. F. cabra; Jacq. H. Schoenbr.v. 3, t. 24.) — Leaves opposite, oblong, slightly serrated; rough above; more downy beneath. Fruit flaked, angular, very hairy.—Gathered by King and Roxburgh in moist rich soil, about the banks of rivulets, in the East Indies. It is but a small tree, with hollow jointed, hairy branches, which sometimes take root about their extremities. Leaves very unequal in size, from one to five inches long, one or two broad, on thick, hoary stems: the upper side is extremely hairy to the touch; the under hoary, and strongly reticulated. Fruit the size of a large nutmeg, very leathery at the mouth; axillary and solitary on the young branches; on the older ones racemose or clustered; tawny, hoary, seldom eaten. This species being, as far as hitherto discovered, singular in its genus for having opposite leaves: we greatly prefer Roxburgh’s name to any other. The milky juice is said to be poisonous, as in several more.

86. F. montana. Burm. Ind. 226.—“Leaves oblong, with wavy serrations. Fruit very small.”—Native of hills in Java. Known by Burman’s short character only.

Section 3. Leaves angular or sinuated.

87. F. reticulata. Thunb. Diff. 12.—“Leaves elliptical, somewhat angular, toothed, pointed, smooth; reticulated beneath. Fruit globose, foliaceous, slightly leathery.”—Found in the East Indies. Branches erect, smooth, purple. Leaves obovate, tapering at the base, three or four inches long, spreading; paler underneath, on shortish thick stalks.

Ficus. Fruit axillary, smooth, larger than a pen, on a stalk a line in length.

88. F. Sur. Forl. Fl. Arab. 180. Vahl. En. n. 76.—“Leaves lanceolate, waved, very smooth, somewhat heart-shaped at the base. Fruit chaffier on the main stem.”—Native of Arabia, where it is called Sur. This tree resembles the Sycomorus. The young branches, stipules, and under side of the footstalks, according to Vahl, are hairy. Leaves rather coniescent, broad-thin lanceolate, with wavy edge and reticulated at the back. The fruit is described by Forlali as the size of a pigeon’s egg, and eatable.

89. F. aphrera. Forl. Fl. Efcul. 36.—“Leaves unequally heart-shaped, sinuated or toothed, rough on both sides. Calyx obsolete, united to the base of the turbinate fruit.”—Cultivated in the gardens and shrubberies of the island of Tana, for the sake of its fruit, which is sweet and pleasant, as well as of the leaves, which when boiled afford the inhabitants an agreeable drink. Tree four or five fathoms high, with jointed leafy branches. Leaves flat long, on very short stalks, rough and hairy, one side narrower than the other. Fruit axillary, in pairs, fleshy, downy, white; the size of a common fig. Forlali; who cites H. Mal. v. 3, t. 22, as having some resemblance to this species; see rufi—a, v. 102.

90. F. sinaita. Thunb. Diff. 2.—“Leaves elliptical, sinuated or toothed, pointed, smooth. Fruit globose, aggregate, fleshy.”—Native of the East Indies. Branches erect, smooth, green. Leaves oblong, toothed, and somewhat angular towards their points, with a reflexed margin: entire towards the base; pale, ribbed and reticulated beneath, three or four inches long, on stalks the length of the nail. Fruit scattered or aggregate upon the small branches, fleshy, knotty, scarcely to big as pepper. Such is Thunberg’s description, and yet, in his specific character, he calls the fruit flaked.

91. F. jublnfis. Buch. MSS.—Leaves oblong, pointed, hard, naked; here and there jagged. Fruit orbicular, tuberculated, axillary, flaked, foliaceous.—Gathered by Dr. Buchanan on the rocks of Upper Nepal, Jan. 28, 1803. A tree with very numerous, rigid, crooked branches, leafy at the ends only. Leaves two inches or more in length, with a taper point almost an inch long, elliptic-lanceolate, moily entire, but often cut, toothed or wavy in the upper part at one or both edges, veiny, rough to the touch, paler beneath. Footstalks short. Fruit towards the end of each branch, the size of a nutmeg, pointed, covered with prominent warts, not hairy, on stalks twice as long as those of the leaf, thickened above the middle, where there is a small three-angled involucrum.

92. F. rosifera. Lam. Dict. v. 2, 498. Vahl. En. n. 79.—Leaves oblong, unequally angular and wavy, with a linear obtuse point; smooth above. Fruit globose, smooth, on short stalks.—Gathered by Commodore in Java. Branches slender, roughish with minute points when young. Leaves on short rough stalks, two or three inches long, of a singular abrupt and irregular figure, irregularly veiny, reticulated; paler and somewhat harish beneath; the point almost an inch long, rather broadened towards the end. Fruit the size of a pea, axillary, two or three together, on very short stalks. The leaves of this species suggest some idea of the fifth called Cbatoon longroflris, figured in Borlinoet’s Ichthyologia.

93. F. difformis. Lam. Dict. v. 2, 500. Vahl. En. n. 80.—“Leaves oblong, acute, rough, of various shapes; undivided; somewhat angular; sinuated; or deeply laciniated.”—Native of the Philippine islands. We know nothing of it.
it but the above definition of Lamarck, who quotes a
fynonym of Ray which we would rather apply to F.
 heterophylla, n. 99, if that be different from the present,
which we doubt. Lamarck indeed appears to have had two
distinct plants under these names, but his heterophylla is not
that of Linnæus. See rufescens, p. 102.

Section 4. Leaves divided.

Fl. Arab. 179.—Leaves ovate or lobed, serrated, acute,
rough; heart-shaped at the base. Fruit pear-shaped, smooth,
flalked, axillary, solitary.—Native of Arabia. Branches
smooth. Leaves from two to four inches long, sharply fer-
rated throughout, velvety; paler, with purple veins, beneath;
on slender footstalks, full an inch long. Fruit the size of a
hazel-nut, its leaf shorter than that of the leaf, with a small
two-leaved involucrem.

95. F. birta. Vahl. En. n. 82.—"Leaves oblong, un-
divided or three-lobed, finely serrated; somewhat heart-
shaped at the base; smooth above. Fruit small, prickly."—
Native of China. Leaves divergent, three-lobed towards the
extremity; lobes pointed, the lateral ones small; ribs
hairly beneath. Footstalks hairy, an inch and a half long.
Fruit axillary, solitary, the size of a pea. Vahl saw a Java
specimen with some leaves undivided; and two or three
fruits together, twice the above size.

96. F. truncata. Vahl. Symb. v. 1. 83.—"Leaves oblong,
undivided or lobed, entire, rough. Fruit falked, oblong,
abrupt."—Native of the East Indies. Branches angular,
smooth. Leaves above two inches long, on short falked
footstalks, either undivided, or with three, sometimes five,
oblong lobes, the lateral ones blunt. Fruit rough with
minute points, its top as it were cut off abruptly.

97. F. ferrata. Ibid. 83. Forkl. Fl. Arab. 179.—
"Leaves oblong, undivided or palmata, rough, with waty
teeth. Fruit flalked, globose, very rough and hairy."—
Gathered by Forkell in various parts of Arabia, where
the leaves are used to clean and polished rusty iron. Branches
and younger leaves very rough with numerous extremely
minute points. Fruit the size of a hazel-nut, on short
flalks.

98. F. toxicaria. Linn. Mant. 305. (F. toxic a; Thunb.
Dill. 14. F. Padana; Burm. Ind. 226.)—"Leaves ovate,
or heart-shaped, cut and lobed, somewhat toothed; white
beneath. Fruit flalked, ovate, downy."—Found near the
town of Padano in Sumatra, by Garcin, who reports it to
be extremely poisonous. The leaves are a foot long, being
equal in size to those of F. baugherifera. Burman. Fruit
the size of a plum. Thunb.

99. F. heterophylla. Suppl. 42. (F. ducriebula; Vahl.
Symb. v. 1. 93. F. indica sylvestris, inda ifes, &c; Ren
dil. v. 9. append. 5. 12.)—Leaves oblong, undi-
vided, three-lobed and cut, very much toothed; lanth
both sides. Fruit falked, flaked, globose, tuberculated,
rugulose.—Gathered by Reichen in the East Indies, where
it is called Mr. Ait., water 67; from it's inhabiting the
banks of rivulets and other watery places, so overrun with
the prickly ratten, Calamus Ratang, as to be hardly accessi-
ble. The branches are reddish brown, slender, roughish;
angular and downy at their ends. Leaves on short stiff,
rough stalks, green and very rough to the touch, on both sides,
with extremely minute carthaginous points; their shape re-
markably various, some being oblong, undivided, acute,
partly entire, partly toothed for a considerale space, but
quite irregularly; others with a deep wide rounded entire
fult at one, or often both, sides, thus become two or
three-lobed, and are toothed unequally like the former.

Veins pale, forming large quadrangular reticulations. The
length of each leaf is from two to four inches. Fruit the
size of a musquet-ball, pale, covered with very minute
rough points, and with falttered slightly prominent warts,
its mouth obtuse, closed with broad slit flaps. Fruits leaf-
axiliary, thick, shorter than the footstalks, rough with
little prickles, and bearing an involucrem of three small
obtuse coelate leaves, a little below the fruit. The syno-
nym of Linnæus and Vahl are determined by authentic
specimens; that of Ray we can only guess at, but his de-
scription answers exactly to our plant. He says the leaves
are used for polishing wooden furniture, and that the fruit
is mucilaginous, sweet, eaten by children and birds only, but
useful for cataplasm. When boiled and bruised. The inner
rark is given in decoction for the generaha, and to throw
out the measles. We cannot account for Linnæus's de-
scribing the fruit as smooth, nor can we answer for Vahl's
heterophylla being the same as ours, though it is very po-
licable for it might happen to be young fruit only; but ours
in an early stage is rough.

100. F. repens. Ruxb. MSS.—Leaves unequally heart-
shaped, finely toothed throughout, rough on both sides;
undivided; or three or four-lobed. Fruit falked, flaked,
obovate, abrupt, prickly.—Communicated by Lord Viscount
Valentia from the East Indies. Branches slender, downy
when young. Leaves on some branches four or five inches
long and three broad, heart-shaped, with one side of the
base much larger than the other, on slender footstalks two
inches-long; on other branches unequally heart-shaped at
the base in a similar manner, but much smaller, and deeply
three-lobed, one lateral lobe usually divided, their foot-
stalks scarcely an inch long, and more downy; these seem to
be younger leaves than the undivided ones; all are rough with
minute points and bristles, paler beneath, minutely but
sharply toothed throughout, somewhat pointed. Fruit
axillary, the size of a filleted or bigger, tapering at the
base, lopped at the end. Fruit stalk shorter than the foot-
stalk, with a small three-leaved involucrem about the mid-
le, which is close to the fruit when very young. This is
probably nearly related to the following, which we have not
seen, but the descriptions of their leaves can scarcely be
made to agree.

101. F. cannabifera. Lour. Cochinch. 668.—"Leaves of
the stem halfate, cut; those of the branches ovato-lanceo-
late, slightly ferrated. Stem nearly erect."—Native of the
plains of Cochinchina. A furb six feet high, branched, with
a smooth tough and fibrous bark. Leaves flalked, falked,
very rough. Fruit oval-top-flaked, on long, simple, fo-
liary, lateral flalks, with a three-cleft rounded involu-
crum.

102. F. rufescens. Vahl. En. n. 89. (F. heterophylla;
Lamarck. Dict. v. 2. 499. Vahl-tengerat; Rheede H. Mal.
v. 3. 83 t. 62.)—"Leaves ovato-oblong, somewhat toothed,
undivided or lobed, rough. Fruit slightly flalked, hairy
like the flalks and branches."—Native of China, and the
East Indies. Synonym. Leaved green on both sides,
about five inches long, and half as broad, on flalks not
an inch in length; some of them undivided, others with
three or four deep flutes, about as in the common fig-
tree. Fruit clothed with reddish hairs or bristles. Lah-
ara. Rheede says his plant is a climbing furb six or
seven feet high, throwing out long trailing branches in
every direction.

103. F. moripholia. Ibid. n. 90.—"Leaves in three deep
divisions, very rough; their segments lanceolate, angular,
and somewhat pinnaed."—Native of the East Indies.
Branches slender, scarcely rough, a little downy in the
upper part. Leaves flaked, alternate, obtuse at the
bist, three-ribbed; vellums above; slightly veiny beneath;
delicate of pubescence, but very rough on both sides
with minute points, the upper sides appearing under a
magnifier as if covered with small white, membranous
scales. The segments are narrow and tapering. *Vahli.*

104. F. simplicifolia. *Lour. CochinC* 667.—"Leaves
palmarive. Stem perfectly simple. Fruit compressed."
Native of the woods of Cochin China. A shrub five feet
high, with a straight upper tier of delicate of branches.
Leaves large, flaked, scattered, rough. Fruit small, ax-
illary, sessile, solitary, roundish, fawn-coloured. *Leucici-
na.*

105. F. Carica. Common Fig. Limn. Sp. Pl. 1513.
Miller Illust. t. 100. Trew Eebth. t. 73, 74, excell. *a.*
(Tancers and Chamerion; *Ger. em. 1510."
Native of the south of Europe and some parts of Asia, where it is also
generally cultivated, but not bever the severe winters of the north of Europe, nor even our own, without
protection. Stem brached from the bottom, from six to
twenty feet high, with long, twilled, plant, round, grey-
ýh branches, rough when young. Leaves deciduous, a
span long, in three or five deep rounded lobes, of which
the central one is the largest, the outermost much the
smallest; they are of a deep green, scarcely paler, but
rather more hairy; beneath, furnished with radiating ribs,
one to each lobe, and many transverse veins. Fruit foli-
tated. One to three thick flak, tapering at the base, and
furnished with a three-leaved involucrem. Its colour is
generally purplish, its pulp soft, sweet and fragrant.
There are numerous varieties of cultivated figs, of which
the most hardy is the Common Purple. Others are ei-
ther more tender, worse bearers, or less desirable in
flavour. Several excellent kinds however are found in the
southern parts of France, Italy, Spain and the Levant.
In those countries figs are usually brought to table, with
melons and mulberries, in the beginning of the dinner, as
well as at breakfast, and do not in general make a part
of the diet.

The *Carica* in its wild state is a more humble and
distorted shrub, bearing fruit which comes to no perfection
as to flavour, but the parts of fructification are very
perfect, and the seeds are only ripened, even in France.
Such figs as seem to fall off before they arrive at matur-
ity, are commonly those in which the flaminis are most
numerous or effective, and which have therefore attained
their final perfection. These are carefully collected in
the Levant to impregnate the female blossoms of the
cultivated fig, their pollen being probably more perfect
than what is produced by the flaminis of such individ-
uals as have, on the other hand, more perfect petals.
In other words, the plants are incompletely pollinated, like
the mulberry and many others. This will explain the mystery of
Caprification, whether wounding the fruit be useful to
promote its ripening, or whether the perfecion of the pulpy
receptacle be owing chiefly to the vigorous growth of the
female flowers consequent to their impregnation. Though
both causes seem to co-operate, we should lay most stress
on the latter, which the analogy of other fruits confirms. See
Caprification.

All the species of *Ficus* are either trees or shrubs, whose
secreted fluids are milky, more or less acid or acetid, how-
ever sweet and wholesome the fruit of severer, though not
all, may be. The leaves are simple, flaked. Stipulas
lateral, not intrafolaceous, in pairs, membranous, decid-
ous, generally taper-pointed. Flowers more or his poly-
gamous.

We have in the above synopsis of the species added fourteen
to those of Vahli, though we have presumed to reduce
two of his to one; see n. 90. Possibly some of the rest,
which he, as well as ourselves, have been obliged to
adopt upon fruit, may, on a future examination, prove
distinct from each other, while it is probable that nu-
murous undescribed species may still be latent in the wilds of
Asia and America.

*Ficus,* in *Gardening,* a tree of the deciduous fruit kind,
and the fruit cultivated are: the common fig-tree (*F. carica*);
the Egyptian fig-tree, or ficume (F. *sycomorus*);
the poplar-leaved fig-tree (*F. religiosa*); the Bengal
fig-tree (*F. Bengulensis*); and the Indian fig-tree
(*F. indica*).

Of the first species there are several varieties, the chief of
which are the following:

*Brown Ischia fig.*—This is a fruit which has a large fruit,
short, globular, with a pretty large eye, pinched in near the
foot-flake, of a brown or dehnt colour on the outside, and
purple within; the grains large, and the pulp sweet and high-
flavoured; it often bursts open as it ripens, in the end of
July, or the beginning of the following month. This has
its ripening well on standards in warm soils and situa-
tions.

*Black Genoa fig.*—This is a kind which has a long fruit,
that swells pretty large at the top, where it is obtuse; the
lower part is much more slender towards the half; the skin a
cart purple colour, almost black, and has a purple farina
over it, like that on some plums; the inside is of a bright
red, and the flesh very high-flavoured. It ripens early in
August.

*Small white early fig.*—This is a fruit which has a round-
fruit, a little flatted at the crown, with a very short
foot-flake; the skin thin, and, when fully ripe, of a pale yel-
lowish white colour; the inside white, and the flesh sweet,
but not high-flavoured. It ripens in August, as in the pre-
ceding kind.

*Large white Genoa fig.*—This is a kind which has a large
globular fruit, a little lengthened towards the half; the
skin thin, of a yellowish colour when fully ripe, and red
within. It is a good fruit, but the trees are not good
bearers in general.

*Black Ischia fig.*—This, which is a short fruit, of a mudding
size, a little flatted at the crown, has the skin alm-
most black when ripe, and the inside of a deep red; the flesh
very high-flavoured. It bears well, and ripens in August
in this climate.

*Malta fig.*—This, which has a small brown fruit, much
compressed at the top, and greatly pinched towards the
foot-flake, has the skin and inside of a pale brown colour;
the flesh very sweet, and well flavoured. When the fruit is
permitted to hang upon the trees till shrivelled, it becomes
a fine sweetmeat.

*Murray, or brown Naples fig.*—This is a kind which has a
pretty large globular fruit, of a light brown colour on the
outside, with faint marks of a dirty white, the inside
nearly of the same colour; the grains are pretty large, and
the flesh well-flavoured. It ripens the latter end of August
in general.

*Green Ischia fig.*—This is a fruit which has an oblong
fruit, almost globular at the crown; the skin is thin, of
a green colour; but, when fully ripe, darkened through by the
pulp to a brownish cast; the inside purple, the flesh
high-flavoured. It ripens about the end of August.

*Madonna, Brunswick, or Hanover fig.*—It is a kind which
which has a long pyramidal fruit of a large size; the skin brown; the flesh of a light brown colour, coarse, with little flavour. It ripens the end of August, and the beginning of September.

Common blue, or purple fig.—This is a fruit which is oblong, it is a great bearer. The fruit ripens in August in general.

Long brown Naples fig.—This is a kind which has the leaves deeply divided; the fruit long, somewhat compressed at the crown; the foot-tails pretty long; the skin of a dark brown when fully ripe; the flesh inclining to red; the grains large, and the flesh well-flavoured. It ripens in September.

Tillou Ichia fig.—This is a fruit which has a large fruit of a pyramidal form; the skin is yellow when ripe, and the flesh purple and well flavoured. It is not a good bearer, but ripens in September in moist caves.

Small brown Ichia fig.—This is a fruit which has a small pyramidal fruit, with a very short foot-tails; the skin of a light brown, the flesh inclining to purple, of a very high flavour. It ripens late in September. It is not a good bearer.

Gentile fig.—This fruit has a middle-sized globular fruit; the skin, when ripe, yellow; the flesh also inclines to the same colour; the grains large, and the flesh well-flavoured, but it ripens very late, and is a bad bearer.

There are also other sorts, as the beet early white, black Provence, Cyprian, Ford's feeding, green Naples, large black, large blue Marfilles, Milward, small black Ichia, white Ichia, yellow Cesar.

Those which are most proper for a small garden, according to Mr. Forsyth, are; the large white Genoa, early white Murray, small brown Ichia, and the black Ichia.

It is affirmed by the same writer, that in a good season the brown, or chestnut coloured Ichia, the black Genoa, the small white early, the Murray, or brown Naples, and the common blue, or purple fig, will ripen on standards.

The second sort is often here called the lycomore-tree, and mulberry fig-tree. This, and not the great maple, is the right lycomore.

The fifth sort is often known by the name of banyan-tree, and is a native of the East Indies.

Etched of Culture.—The first sort and varieties may be readily increased, either by suckers, layers, or cuttings, but the two last are the best methods, according to Mr. Forsyth, who has had great experience in raising fruit-trees of this kind.

The suckers should be taken off from the roots as low down as possible, and, after being trimmed, planted out in nursery-rows, at the distance of two or three feet from each other, with the tops entire, to take their natural growth, when intended for standards; but when for walls, espaliers, or dwarfs, in the situations where they are to remain. In the latter case, they should be cut or headed down to fix or eight inches in the early spring, to induce lateral shoots to be thrown out near the ground.

The layers should be made from the well-ripened woody shoots of the bearing trees, and be laid down in the autumn, or early in the spring, being protected from frost during the winter by tan or some sort of flaky material. When the plants are sufficiently rooted, as in the following autumn, they should be taken off and planted out in the places where they are to remain, as they do not bear transplanted well, being covered at the roots with dung, tan, or litter during the winter. The cuttings should be taken from the well-ripened, woody shoots of the former year, which, without being shortened, may be planted out in the beginning of the autumn, on beds of loamy earth, in a warm, sheltered situation, to the depth of eight or ten inches, protecting them with tanners' bark and litter during the winter; the litter being removed as the spring advances. When they have broken good root in the following autumn, they should be taken up and planted where they are to grow and remain.

Three sorts of trees are mostly cultivated as standards in warm climates, but in this, in general, against walls or as espaliers; and only sometimes as standards.

The sorts of trees cultivated against walls are those of the blue and white kinds, but several of the others succeed well in this management, where they are duly attended to.

But for espaliers, and as standards, the fifth, second, third, ninth, and tenth varieties are probably the most proper.

In their culture as wall-trees, they should always be placed in sunny situations, and the purpose of the fruit bring the most effectually ripened, as in that of a full southern exposure, but an east or west aspect will answer very well when that cannot be had with convenience.

In the planting them out, where the walls are of considerable height, fifty or sixty feet distance may be sufficient; but in low walls, twenty or more are not too much space. Mr. Forsyth advises from twenty to twenty-five feet, as the most suitable distance for planting these trees at, in general.

Where the trees are planted against fire-walls, they should not be kept too close, be drawn by glades, or have the heat too great; but have at all times, when the weather is favourable, a good share of free air admitted, and if the trees are young, care should be taken that their roots are not extended beyond the reach of the covering; they must be frequently watered when they begin to flower, otherwise it will drop off; but old trees, whose roots are extended to a great distance, only require to have their branches now and then sprinkled over with water. Where these trees are properly managed, the full crop of fruit is greater than upon those which are exposed to the open air, and ripen six weeks or two months earlier, and a plentiful second crop may also be obtained, which ripens early in September, or sometimes in August; but the first should not be allowed to these trees till the beginning of February, as when they are forced too early, the weather is frequently too cold to admit a sufficient quantity of fresh air to get the fruit; but the covers should be put over the trees a month before to prevent the shoots from being injured by the extreme state of the weather.

The management of the trees in the common method after they have been headed down or shortened in the manner mentioned above, whether they be on walls or espaliers, is that of training them horizontally, so as to preserve the branches in an equal and regular manner on each side, at the distance of from five to eight inches from each other, and, for the most part, keeping their full length without any breaking, that as large a proportion of young fruit bearing wood as possible may be preferred. Some, however, advise their not being led to close, considering a foot or eighteen inches as little enough room for them.

And in the pruning of the trees, Mr. Forsyth advises that it should never be done in the autumn or winter, but in the early spring months. The best time for this, it appears, is to be the latter end of April or beginning of May, allowing months, as by this period it may be ascertained what branches have been destroyed by the severity of the winter. And as the ends of these branches, the wood of which has not ripened well in the autumn, will be most injured, they should be...
be cut into the found wood as near to an eye or bud as possible.

In cases where the branches have been permitted to run up, so as to leave the bottom in a naked state, every other branch is advised to be cut out, as near to the ground as it can be done, by which the walls or eipillars will be provided with good young wood, care being taken to stop the ends of the shoots in summer, as about the beginning of June, in order to induce side-shoots to be thrown out for fruiting the following summer; by which time plenty of fine wood will be provided, and then the remainder of the old branches may be cut out as before, pruning their young shoots as in the preceding cafe, constantly pinching off the ends of all the strongest shoots at the top bud, except such as are leading ones.

But in the spring pruning, as the fruit is produced near the tops, the bearing shoots should never be shortened, nor should the fine shoot side and fore right shoots be cut off, except when decayed; as they ripen better than the long strong ones, and are not apt to be destroyed by frosts in the winter season. By this practice, it is contended that the trees will be covered with fruit from the tops to the bottoms of the wall, &c., instead of having a few only at the top, as is the case in the common method of management with these trees.

In summer, as many shoots are sent off, some of those that are irregular and useless may be rubbed off, and the others trained in for the forming of future bearing wood. The proper period for this is about the beginning of June, and in the two following months.

After the fruit has attained the size of small nutmegs, the points of the top buds are recommended by Mr. Forfyth to be pinched or cut off with a sharp knife, some of his powdery material being immediately applied, to prevent the oozing out of the milky juice, and the consequent exhaustion and injury of the tree.

In order to prevent the necessity of cutting the trees down in the above manner, they should be covered in winter before the approach of frost, which would destroy the ends of the shoots before the wood was ripened and rendered hard.

Where fig-trees are greatly injured in the winter, the best practice is to cut them down as near the ground as possible, as in the following year, by the above management, they may be got into a good bearing state.

The best mode of protecting these trees is, according to Mr. Forfyth, to cover them with bentings, or short grafts, from the pleure-ground, which he finds answers the purpose very well; after it is thoroughly dry, it may be put in a cock, covering it with straw, to prevent the rain from penetrating into it, which would cause it to heat and rot; or it may be put into a shed. If grafts cannot be procured, some dry moss may be employed. In performing the work, cover the trees with laurel, yew, fir, or spruce boughs, and then tuck in the short grafts or moss among the branches, beginning at the top of the tree, tucking in the grafts, &c. as you descend, till you come to the bottom.” Fern, when well dried, he says, makes an excellent covering. The trees may be thatched on the outside with the long leaves of the common fern; and where these can be got, there will be no occasion for short grafts. When it can be procured, which it may in most country places, it will, he says, be found preferable to laurel.

They may also be sheltered in winter by wrapping hay or straw bands round the branches of the trees; and then opening the ground, laying in the branches, and covering them over with mould about nine inches deep, leaving the ends of

**Garden Trees.**

Great care, he says, should be taken not to uncover the fig trees too soon in the spring; and it should be done partially, as there are frequently frosts and cutting winds in the months of April and May, which will infallibly kill the young fruit as they make their appearance in the spring.

Thence branches which have been laid into the ground should be taken up in the month of April, leaving the hay or straw-bands taken off, and then nailed to the wall. Some fern leaves, or any other light coverings, may be flung in among the branches, to protect them from the drying winds and frosts till the fruit comes to the size of a large walnut, or rather till the leaves are sufficiently large to protect the fruit.

It is observed, that the Italians, when they wish to forward the ripening of figs, drop in a little sweet oil, from a quill, into the eye of the fruit; but care must be taken not to hurt the skin, which will make the fig burst. This will make a difference at least of a fortnight in the ripening of the fruit.

It is also recommended, as soon as the leaves begin to fall, to brush them off with a broom, but by no means till they will come off easily. If they are forced off before they begin to wither and decay, the trees will bleed at the foot-talks. At the same time the talks should be cleared of all the small late fruit, which, if suffered to remain during the winter, will rot, and injure the tree, so as to prevent it from bearing the ensuing summer. If any milk be observed oozing from the foot-talks, a little of the composition should be used, which will stop it, and heal the injured part. See **Composition.**

By doing this, the ripening and hardening of the wood will be facilitated before the winter frosts set in.

In standard-trees of all sorts little pruning is necessary, only just to take out the very irregular branches and the young shoots, when too much crowded, and the dead ends of the shoots, as well as any dead wood that there may be in them.

Mr. Forfyth, however, observes, that as the branches of standard fig-trees are very liable to be killed in severe winters, it will be necessary to lay them also in the ground, wrapping them up in hay or straw-bands, as directed for wall-trees. It will be sometimes impracticable to lay down the middle branches; they must, therefore, be well covered with hay or straw-bands, and the outside ones laid down, going regularly round the tree, and taking particular care not
not to hurt them with the spade, then to mulch them with rotten leaves, &c.

Where Mr. Forlyth has been under the necessity of cutting fig-trees down near to the ground, after hard winters, he has found, by the use of his composition, that "in the course of two years, the new wood has covered over the old stump, and the branches filled up the former space, bearing also plenty of fine fruit."

The other species are easily propagated by cuttings during the summer season. When the cuttings are taken from the plants, they should be laid in a dry sandy place for two or three days, that the wounds may be healed over, otherwise they are apt to rot; after which, they should be planted in pots filled with sandy light earth, and plunged into a moderate hot-bed, where they should be shaded from the sun, and two or three weeks a gentle refreshment with water, if the season is warm; but they must not have too much moisture, as it would infallibly destroy them. When the cuttings have taken root sufficiently, they should be each planted into a separate small pot filled with undug earth, and replanted into the hot-bed, shading them until they have taken fresh root; then they should have a large share of free air admitted to them at all times when the weather is favourable, to prevent their drawing up weak, and to give them strength before the cold comes on. In autumn the pots should be removed into the house, and be plunged into the tank-bed, where they should contentedly remain, and be treated in the same manner as other tender plants from the same countries, for although two or three of the forts may be treated in a harmer manner, yet they will not make much progress. They may likewise be increased by layers when necessary.

These are shrubs in this climate which afford variety in flower collections.

Ficus, in Conchology, a name given by authors to a peculiar species of sea shell. It is of the genus of the dolium, and has a remarkably depressed calicle. See Conchology.

Ficus, or Ficaria, in Surgery, signifies a tuberecel, or excrescence, about the anus, or pudenda. The term is said to be derived from vi, to produce, or cile from the Hebrew phig.

Fidari, in Geography, a river of European Turkey, in Livadia, which runs into the sea, eight miles N. of Patras.

Fid, an iron pin used at sea to splice or fallen ropes together; it is made tapering and sharp at one end. There are also fids of wood, which are much larger than the iron ones.

The pin also in the heel of the topmalt, which bears it upon the chefs-tree, is called a fidd.

Fid-d hammer, is used for a hammer, the handle of which is a fidd, or tapering into that form.

Fiddes, Richard, in Biography, a learned divine, and polemical writer, was born at Hunmanby, in the county of York, in the year 1671, and went first to study at Cambridge, but afterwards was admitted of University College, in Oxford. Entering into holy orders, he obtained the living of Hullham, in his native county, but the air of the place not agreeing with his health, he was forced to forego all thoughts of residing on his living; having while there left the use of his speech, which he never after perfectly recovered. He was appointed chaplain at Hull, but he spent the latter part of his life at Putney, where he died in 1735.

In 1718 and 1720, he published a Body of Divinity, in two volumes, folio; in consequence of which, the university of Oxford conferred upon him the degree of doctor in divinity. In 1721, he published two letters on the soul's immortality, occasioned by the epitaph on the duke of Buckinghamshire. In 1724, appeared a Life of Cardinal Wolsey, in which the free manner he had treated some opinions induced a belief, that he was favourably inclined to the Catholic tenets. The same year he published a treatise on morality, and he also wrote fifty two practical discourses. His first publication was a prefatory epistle concerning some remarks to be made on Homer's Iliad, addressed to Dean Swift, &c. Gen. Biog. Diet.

Fiddichow, or Fabvchova, in Geography, a town of Hindar Pomernania, on the Odas, 22 miles S.W. of Stargard. N. lat. 53° 13'. E. long. 14° 13'.

Fiddle, probably from Fid, Latin. This is the vulgar name for the violin, which is a modern instrument, as the use of the bow cannot be traced in antiquity. The earliest mention which we have found of the fiddle in England, is in the legendary life of St. Christopher, MS. Vernon. Bodl. Lib. (119) written about the year 1200.

"Christofre him served long.

The king loved the melody of sithele and of longing."

The fiddle, however, did not seem in common use in feasts, mummeries, and processions, for some hundred years after this period. It is mentioned by Chaucer, but was not allowed to be a concert instrument, till the reign of Charles II. who, in imitation of Louis XIV., established a band of twenty-four violins, alias fiddles, which gave birth to Tom Purcell's song of "Four and Twenty Fiddlers all on a Row," &c., a humorous production in which there is a mockery of every instrument, and almost every trade; and which, in our own memory, used to be performed between the acts, or between the play and farce, by some man of humour at benefit. See Violin, Rebec, and Bow.

Fiddle-shaped leaf, in Botany, folium panduriforme, is oblong, broad at the two extremities and contracted in the middle, like a fiddle or some sort of guitar, and not like the ancient pandura or reed-pipe, as the Latin name implies. See Leaf.

Fiddle wood. See Citharexylon.

Fiddler's Elbow, in Geography, a bend of Wood creek, between the outlet of South bay, and the mouth of the creek at the northern end of lake Champlain, opposite to the mouth of East bay. The mouth of Wood creek lies in N. lat. 43° 32'. W. long. 73° 15' 12".

Fide-Jusserand Affili., See Asinusus.

Fiedship, in the Civil Law, is a surety, or one that obliges himself in the same contract with the principal, for the greater security of the creditor or flippuror. See Bail and Cautionary.

Fidei-commisum, in the Roman Law, the appointing of an heir, or bequeathing a legacy to a person on this condition, that he surrender the inheritance or legacy to another person, for whom the same is originally meant; or it is an inheritance left in trust with any one, for the use of another.

Fidei-commissa were much used among the Romans. In the French law the thing is become odious; as being, ordinarily, no other than an expedient in favour of persons to whom the laws forbid any thing to be given. In order to this, some trusty friend is chosen to be made legal heir, under a tacit agreement to deliver the inheritance to the person incapacitated by law. But of later times the same expedient has come in use with regard to persons capable of inheriting; to whom the testator, for particular reasons, does not care to leave the inheritance directly.

As it happened that the fidei-commissioners did not always faithfully restore what was trusted to them, Augustus took
took proper measures to oblige them thereto; this to end a
prator was erected, whose business was restrained to the
single matter of fidei-communions.

As a testament was null without the institution of an heir,
and it frequently happening that the fidei-commissioner re-
fused to accept the trust, upon which the testament fell to
the ground; to engage somebody to accept it from a con-
\federated advantage, the P: galiani fettus confiduum de-
creed, that the fidei-commissioner should be at liberty to
retain a fourth of the fidei-communion.

TIDELES, in Church History. See BELLIVERS.

TIDENA, in FIDENA, in Ancient Geography, a town of
Italy, upon the Tiber, N. of Rome and N. of Veii. It was
founded on the territory of the Sabins, by a colony of Allia,
and seems to have been very powerful before the foundation
of Rome, as it fulfilled a war against it, which lasted from
the year of Rome 170 to the year 327, when the Fidenates
were subdued by the dictator Emilius Manerucus.

FIDENTIA, a town of Gallia Cispadana, situated
towards the S. E.; near which the troops of Carbon were
cut to pieces by those of Sylla.

FIDICULE, in Antiquity, is often used to signify
the same with equus, a kind of punishment used among
the ancients.

Fidicule, in a more proper sense, denotes the cords
wherein the criminals' limbs were diffident on the
equus.

FIDMIN, in Geography, a town of Egypt; five miles
W. of Fayum.

FIDRA, a small island near the coast of Scotland,
at the entrance of the Forth; three miles N.W. of North
Berwick. N. lat. 56° 5'. W. long. 2° 49'.

FIDULEA, a small island in the Grecian Archipelago;
four miles S.W. of Stambelia.

FIE, the fame with fud or far, which see.

FIEP D'HAMBERT, a name given by the Normans, and
adopted by the French, to that species of tenure denomi-
\ated a kniajes-service, which see.

FIEGO, or Fijogo, in Geography, a Sea-port town of
Japan, on the S. coast of the island of Niphon, with a large
harbour in the bay of Oolce; 24 miles S.S.W. of Oolce,
and 34° S.W. of Macao.

FIELD, in Agriculture, is a portion of land mostly included
by some fort of fence, and employed either in tillage or as
pasture. Fields should be proportioned in size to the na-
ture of the husbandry under which they are chiefly man-
ge, where they are of the ample kind, they may be
much larger than where they are of the grazes or grazing
description. (See INCLOSING OF LANDS.) For the method of
finding the contents of a field, see AREA, CHAIN, and
SURVEYING.

FIELD-FALLOW, a term frequently made use of to signify
a common field, which is occasionally cultivated under the
fallow system. See FALLOW.

FIELD-GRAVES, any sort of graves cultivated or grown in
the field. See GRASS.

FIELD-HIGHLAND, those sorts of husbandry or cultivation
which are practised in the field, whether to relate to
tillage or grass. See HUSBANDRY.

FIELD-WELL, the name of a pit or small font of artificial
watering-place for cattle in a field. See DRINKING-FIELD.

FIELD-WORK, that sort of work which relates to the field,
and which is of very different kinds.

FIELD-STAFF, the common name of a perennial weed
often met with in tillage lands. The stem is upright and
branching, rising to the height of a foot or a foot and a
half. It is spotted, rough, and hairy. The lower leaves
are oval, and indented about the edges; but those on the
stalk are divided and pinnated. The flowers are blue, and
of the compound kind, consisting of a great number of
small ones, each divided into four parts, and having one
seed under them. The plant has a bitter disagreeable taste.

FIELD-ALS, or Fieldals, in our Ancient Customs, a kind of
drinking in the field, by bailiffs of hundreds; for which
they gathered money of the inhabitants of the hundred to
which they belonged. But this custom has been long since
prohibited.

FIELD, Campus, in Antiquity, is frequently used for a
public place, or square in a city, &c.

Such were the Field of Mars, Campus Martius; and
Field of Flora, Campus Flora, in Rome; and the Field of
May, Campus Maius, among our ancestors, &c.

Field of Mars was denominated from a temple of that
dity, built therein; it was the scene or place of the assem-
blies called comitia. Tarquin the Proud at length appro-
\rinted it to his own use; but after the expulsion of the
kings, the consuls Brutus and Collatinus restored it to the
public use again, for assemblies and elections.

Originally it was no more than a meadow on the banks
of the Tiber, where horses grazed, and the Roman youth
were exercised to war. But it was afterwards erected into
a magnificent square, adorned with statues, &c. See Campus
Martius.

Field of Flora, was the place where the laws, edicts, and
constitutions, were published.

Field of May. See Campus Maius.

Field Baffi, in Botany. See ClinoPodium.

Field Baffi, American. See Monada.

Field Baffi, Syrian. See Ziziphora.

Field, Clare, was anciently a place enclosed, or raised
in with a barrier, for jits and tournaments to be per-
formed in.

Field, Elysium. See Elysium.

Field, Richard, in Biography, an able champion of the
doctrines and discipline of the church of England, was
born at Hemphied in Hertfordshire, in the year 1561. In
1577 he was admitted a member of Magdalen college, Ox-
ford, where he took his degrees with high reputation. His
great learning and talents pointed him out as adapted to fill
certain useful and important places in the church, till at
length he chose divinity reader to the society of Lin-
coln's Inn. In this situation his services gained him many
friends among the learned members, one of whom presented
him to the valuable living of Burrowclere in Hampshire,
and in a short time after he was offered the still more valuable
benefice of St. Andrews, Holborn, but he chose to adhere
\hat the in the country, as affording him more ample opportu-
nities for study, on which his mind was very intent. In
1588 he took his degree of doctor of divinity, and became
chaplain in ordinary to queen Elizabeth, and was soon after
made prebendary of Windlor. On the death of the queen
he succeeded to the late office of chaplain in her suc-
cessor James; and was entrusted with the management of
some special comunions inned for ecclesiastical canons, and
the exercise of spiritual jurisdiction within the diocese of
Winchell. In 1604 he obtained a prebendary of Windlor,
and when the king went to Oxford to witness the scholastic
exercises at that university, Dr. Field was sent for to take
a part in the divinity act, and the manner in which he per-
formed his part reflect the highest degree of credit on his
learning, and afforded uncommon satisfaction to the splendid
audience.

In 1610 the king bestowed upon him the deanery of
Gloucester, but he continued to reside and labour at Burrow-

 cler's,
clere, only going to Gloucester occasionally to preach when his particular duty required him. Sometimes, in the winter months, he usually spent at Windsor, and was often selected to preach before the king, who exclaimed on first hearing him, "This is indeed a Field for God to dwell in." The monarch held Dr. Field in so high esteem that he was anxious to promote him to the bishopric of Salisbury, but his counsellors prevailed upon him to give it to another. The king, however, determined to raise him to the see of Oxford, which was expected to become vacant in a short time, but before the vacancy occurred, Dr. Field died of an apoptyx, in the year 1616, in the fifty-fifth year of his age. His principal work, as a literary man, was entitled "Of the Church," four books, folio. This was published in the year 1665, and in 1670 the author added a fifth book, with an appendix, containing a "Defence of Such Pages of the former Books that have been excepted against," or wrested to the maintenance of Romish Errors." Dr. Field was universally respected, and at his death generally lamented. "He was," says Wood, "much against disputing about the high points of predestination and reprobation, nor did he like that men should be busy in determining what God's decrees in heaven are. He was one that laboured much to heal the breaches of Christendom, and was ready to embrace the truth whereverof he found it. His dehre, his prayers, his endeavours, were for peace, to make up the breaches of the church; not to widen differences, but to compose them." Gen. Biog.

Field, in Heraldry, is the surface or face of the field, or escutcheon; thus called, as containing the achievements ancienly acquired in the field of battle.

The field is the ground whereon the colours, bearings, metals, furs, charge, &c. are represented. In blazoning a coat, we always begin with the field: he bears sable, &c.

Among the more modern heralds, field is less frequently used than field or escutcheon.

Field of Battle, in the Military Language. The possession of this, after an engagement, is generally supposed to denote which party has obtained the victory; the worsted army, for the most part, retiring with the view to rally, and eventually to make a fresh stand at some advantageous position: But it does not always follow that possession of the field remains with those to whom the greatest merit attaches; we sometimes see an inferior force repel the attacks of partners, and following its route, leaving to the defeated allies that field, on which a large number of them may bury their lair, while the victorious band, though somewhat diminished in numbers, effect a safe retreat. Retention of the field under such circumstances denotes the want of power to follow, and, according to the military phrase, is "a ransom victory": usually to be clasped with those sad effects produced by severe contests on an enemy's country, where the latter are constantly obtaining both supplies and reinforcements, from which the invaders are, or should be, completely cut off. We cannot give a stronger representation of this position than is afforded by the glorious struggle maintained by our Spanish allies, who, though certainly in the first instance by no means competent to repel their invaders, at length were routed to a fine state of their situation, and displayed their national character for loyalty, piety, and bravery, in the most glowing colours.

A previous knowledge of the field on which an army is about to engage, cannot but become an object of great importance, not only to the commander-in-chief, but to all those in charge of divisions of the troops under his authority. An intimate acquaintance with various minutiae, such as broken ground in which cavalry cannot act; swamps in which they as well as artillery would be fixed, or at least be unable to fulfill their intentions; strong situations, such as natural lines made by precipices bordered by banks, or fringed with underwood; elevated spots, on which batteries could be placed to advantage, and behind which large bodies of cavalry might be concealed; bridges within command, by means of which a safe retreat might be made; and all such points, are indispensable towards the successful issue of the day.

We do not mean to assert that every commander has it in his power either to choose the field on which he will make a stand, or that, when he has chosen it, he must be thoroughly acquainted with all localities; but it may be permitted us to observe, that no man, whatever rank he may have attained, or whatever service he may have seen, is competent to be placed at the head of an army, but more especially one acting upon the defensive, whose eye does not most keenly search for natural advantages, or who does not, when those advantages are apparent, profit by them in a suitable manner. We particularize the defensive, because that system rarely fails to afford those highly valuable advantages in regard to the several strong positions every country affords, more or less; but which may not always be sufficiently ascertained by an invading army. Thus, it must be evident, that during the apprehension of invasion, our generals, throughout the country, had the fairest opportunities for most accurately reconnoitring every defensible point, whereby they would have been enabled to act with the greatest effect, and to choose their field on almost every occasion, which could not have fallen to the lot of hostile troops, whose advance must invariably have been attended with some uncertainty, and all its train of mischiefs.

In reviewing the great number of plans that have at times been published, wherein the positions of the contending parties and their several movements have been laid down, one obvious feature appears common to a very great majority; namely, that the party which awaited the attack of its adversary, had its flanks, or at least one of them, covered by woods, rivers, villages, morasses, or broken ground. The great object appears to have been there, to throw impediments in the way of the enemy's horde. Hence we see, that so soon as any part of the centre gave way, the whole were thrown into confusion, bearing down the several lines in succession, and offering opportunities for a dreadful display of the powers of cavalry. It appears rather doubtful how far an equal force should place itself, and is to defend home valley, &c. through which alone the enemy could penetrate into a country.

Field-Fortification relates to the formation of such temporary lines of defence, redoubts, &c. as well as of such batteries, of various descriptions, as may be deemed necessary either for the maintenance of a position, or for driving an enemy from that he may occupy. It would be utterly impracticable to afford instructions suited to every case; there being such varieties of locality, as well as of circumstances, which can only be provided for on the spot, and never could come under any general description. Although we are at to consider the science of fortification, in all its branches, to appertain, rather exclusively, to the corps of engineers, yet no general should be unacquainted with the command of an army, unless possessing either an intimate acquaintance with that science, or such a ready conception of the advantages and disadvantages of every position he may assume, as should enable him, as it were by inspiration, to adopt or reject it without hesitation. We fear that this excellent quality rarely comes, as Dogberry says, "by nature,"
FIELD.

1. A paragraph discussing the role of engineers in fortification and the importance of flanking positions for defending positions.

2. A discussion of the principles of field fortification, including the division of work into offensive and defensive strategies.

3. A detailed explanation of how to create trenches and how to position mortars and other artillery for effective defense.

4. A description of how to create a direct fire from batteries and the importance of these positions in defensive strategies.

5. A discussion of the need to protect the flanks of fortifications and the role of engineers in achieving this goal.

6. A mention of the importance of practice and experience in fortification strategies.

7. A conclusion that emphasizes the importance of training and preparedness in defensive warfare.
can be spared for their occupation. When only cavalry is to be opposed, nothing more is necessary than an abattis, (Fig. 7), formed by felling large trees, and after lopping off the more minute branches, placing them, side by side, in a compact manner, with their stems inwards; and either flaking the whole down, or encircling them together with bines, or ropes, &c. so as to prevent them being easily driven away by an enterprising enemy. It is, in general, found best to make even this kind of defence of such a form as may afford flanking fires; observing to place a few guns along the curtains, so as to fire, as it were, in barbet over the upper boughs that point towards the assailants.

Some situations are naturally so strong as to require nothing more than a breast-work; such, for instance, as the borders of a precipice which cannot be taken by assault, and from which a direct fire in every part affords the best means of defeating any party that should approach. In such very strong places a straight line may answer, but, in most cases, flanks should be thrown out, as in Fig. 8. of which the general tendency must be governed by local circumstances. Whatever may be their direction or form, it is proper that no part of the lines intended to afford mutual defence should exceed what is termed the point blank range of a musket ball; which is generally understood to be about 200 or 250 yards, according to the charge of powder. When within 150 yards, the advantages will be greatly augmented.

Fig. 9. represents a continued uniform line, composed of short curtains, a, a, a, a, with the redans, b, b, b, b; these latter must bear such an angle, or be placed at such a distance from each other, as may allow a perpendicular drawn from their faces, at the point of juncture, as at c, to pass just clear of the faillant angle, d; if this be not attended to, the defenders of one redan will pour their fire into that adjoining. And, if the angle be too great, that is to say, more than 100 or 105°, the defences will be weakened in every part, on account of the great obliquity necessary in directing the fire, both in the curtain and in the redan; which, in the firing of musketry, is always attended with bad consequences.

Fig. 10. shews a line of the same kind as that just described, with independent redans, e, e, e, e, thrown up before the curtains, by which they are commanded. These should be placed at sufficient distance in advance, to prevent the enemy, in case they should be able to carry them, from affailing the curtain under cover of the flanks; which they might easily do but for that precaution. The angles of the independent redans should correspond with those of the intermediate ones, which may be about 60, or 65 degrees, according to circumstances.

Fig. 11. shews a very good mode of making alternately short flanks in a regular order, as to resemble the overlapping of tiles: the usual designation is "en cramailfaire," from the French word cramailfaire, signifying that kind of pot-book which can be lengthened at pleasure by means of ratchets. The termination of this sort of indented line ought to be strong; otherwife it would be subject to assault at the point, A, where the addition of the redan, B, adds greatly to its security.

Fig. 12. shews a line of obtuse angles, called swallow-tails, a, a, which would not afford a sufficient flanking fire; therefore it is expedient to mix them alternately with redans. This is an excellent mode for lines not finished with redoubts, or with advanced redans.

Fig. 13. is a line of swallow-tails, a, a, a, mixed with obtuse bastions, b, b, b, wherein it will be seen there is great strength. The addition of a cavalier, c, in each bastion, with a felce, d, in front of the swallow-tail, e, obviously renders such a line truly formidable.

Fig. 14. exhibits a line of curtains, a, a, flanked with bastions, and having redoubts, e, e, in their centres. This is also attended with great strength, especially as the latter prevent the enemy from following up any advantage. We shall conclude this article with observing, that field-fortification must usually be extremely irregular; therefore, on lines of any extent it may be expected to see the whole of the above-mentioned defences intermixed according as the ground may suit them respectively. In some parts, where deep flaiures or crags may intervene, the line will of course be broken; there it will be necessary to place batteries on the most commanding situations, as well as to scourp, and otherwise add difficulties to the ascent, so as to prevent the enemy from making a push in such situations; which, when well defended, may be considered impregnable.

In carrying field-works over rising grounds, some parts of the defences will sometimes expose their flank; when this happens, an encaissement must be thrown up, of sufficient height to obstruct, not only the point-blank, but the ricochet ranges of the enemy's shot.

Circular bastions have been properly exploded; it being evident that the general tendency of their fire was weakened; while, at the same time, that portion most advanced towards the enemy could not possibly be flanked by any other works.

We shall now offer to the consideration of our military readers a few practical observations derived from a small work possessing considerable merit; these are selected because they furnish, in concise terms, the very elements of that highly important topic now under consideration.

1. The spot on which works are to be constructed should determine their figure; nor should any attention be paid to preserving a regular form, which does not occupy the ground to advantage.

2. Every line must be so disposed, that the slope of hills all round, even to the very bottom, be open to the small arms of the garrison, and every part should be discoverable to the distance of at least 500 paces.

3. Works thrown up for the defence of a defile should always be within musket shot of it; which must not be more than 200 yards.

4. The best defence in works that are flanked, or where one side is defended by the fire of another, is that formed by right angles.

5. A faillant angle should never be less than 60°, nor a re-entering angle less than 90°, nor greater than 120°.

6. The entrance into the work should always be in that part least exposed to attack, and if possible in a re-entering angle.

7. Endeavour to prevent, if possible, a longer front to the enemy than he can occupy in making the attack.

8. Avoid all ground commanded by an eminence, either in front, flank, or rear.

9. Never leave your rear so exposed that an enemy can attack so as to turn it.

10. Always make the angles of a work in the directions least exposed to attack; and consequently endeavour to prevent a front to the enemy's batteries, &c.

11. The garrison should never be drawn up more than two deep; allowing an ordinary pace of two feet for each file, and from six to eight paces for each piece of ordnance.

12. If a work is so large as to be defended by a battalion or two, a reserve should be allowed of about one-sixth of the number.
FIELD.

for the men to move and lie down; every soldier will require at least 18 square feet, and every piece of ordnance about 216.

14. Provided the work be not too extensive, the more inward space there is the better.

15. A parapet, to repair cannon, should never be less than 12 feet thick, and for muskets not less than 8 feet.

16. The height of the parapet must be regulated by the situation of the work, and of the adjoining ground; with this consideration, that the height (of its crest) above the banquette should not exceed $\frac{3}{4}$ feet: if higher, men of rather a short stature will not be able to fire over it.

17. The depth and breadth of the ditch must be regulated by the quantity of earth required for the parapet and banquette.

18. A tete de pont, or any work intended to cover the embarkation of troops, or the passage of a river, &c., should, if possible, be made where the line of the river or coast forms a kind of re-entering angle, that the flanks of the corps, as well as those of the works, may be covered. See Field Fortification.

To carry on the work.—The number of workmen must be proportioned to the time allotted for carrying on the work, the quantity of labour, and the number of hands capable of being employed at the same time. When the ditches are broad, the workmen must be posted in two rows; but, if narrow, only in one. In the first case the earth will be thrown by those who are on the outward edge of the ditch to the second row, and by them upon the parapet: for which reason the second row, to keep pace with the first, ought to be twice as numerous. The workmen should never be placed nearer than two paces, or four feet from each other, and two men with shovels should be preceded by one with a pick-axe. If more than usual expedition be required, one man with a wheel-barrow, or basket, may be added to six or eight with shovels. Another row of workmen should also be placed on the parapet, to spread the earth and level it down as it is thrown up. In fixing the fascines, three men will suffice for every 24 feet of the work; these should be provided with two mallets, one saw, and one hand-bill or hatchet.

To form some idea of the time in which a field-work may be completed, compute the number of cubic feet of earth to be excavated, thus; multiply half the sum of the breadth of the ditch, at top, by the depth, for the number of square feet in the profile; this multiplied by the distance between the workmen in feet, will give the number of cubic feet each man has to dig; or being multiplied by the length of the ditch (in feet) will give the cubic contents of the ditch. Now, one man is supposed to be able to move 216 cubic feet of earth in a day during the summer; but this is not always the case. If a field-work be completed in 24 hours, it will be as much as the most diligent workmen are capable of. This time is generally allowed for the formation of a weak profile; 48 hours for that of a stronger, with a revetment of fascines; and 72 for the strongest.

The different slopes for the works must depend upon the nature of the soil, and the materials of which the work is composed. The interior slope of the parapet, though it be fascined, should be one-third of its height, and the slope of the banquette equal to its height. The slope of the scar, or counter-scarp of the ditch, should be from half its height to its full height, according to the soil. The superior slope of the parapet must depend entirely upon the situation of the work, and that of the surrounding country. The interior slope of the parapet is generally lined with fascines, to keep up the earth; but it is not absolutely necessary to fascine the exterior slope, if the soil be tolerably stiff. The embrasures are commonly made 20 inches wide within, and nine feet on the outside. They must always be lined with something to retain the earth; turf is generally preferred, as fascines are too apt to take fire. The manner in which fascines are made may be seen under that head.

It sometimes happens that the soil is so hard as to render it impossible to throw up works by the means of excavation; and where it is a loose sand, equal difficulty would occur regarding its retention, even when kept up by revetments of fascines. In either of these cases, the batteries, &c., must be formed by placing galions (which are) in such order, and contiguous, as may serve to give a proper form to the merlons. The galions may be either lined with leaves, backing, &c., where the soil is a running sand, or they may be filled with something, or whatsoever stiff soil may be at hand; wool, cotton, chips of leather, bark, or whatever may serve to confine the sand, may answer according to circumstances, observing that, in some instances, the whole interior must be gabioned. It will be evident that on a bad soil, such as above described, no ditch could be rendered both efficient and permanent; if lined with fascines, they might prove the destruction of the whole works, should the enemy throw carriages or shells into it. A battery formed of gabions may be run up with great celerity, provided proper materials for filling them be at hand, and plenty of labourers at command. In very hard, rocky soils, there is great difficulty in fixing gabions, on account of the impracticability of driving the necessary stakes. To retain mudbanks, sand bags are often found sufficient. These are particularly serviceable in situations where the opposing troops are very close, being placed so as to lean towards each other, but leaving a small interval, like a loop-hole, and being again crowned with an entire layer of the same kind; they offer an excellent screen, from behind which the assailants may be galled in the most disheartening manner. Sand bags arranged along the top of a low wall, add considerably to the means of defence, especially where the wall is so irregular as to offer the means of flanking.

FIELD-PIERS, a species of artillery intended for service in the field, in contradistinction to such pieces of ordnance as are appropriated to the defence of fortified places, to naval warfare, and to battering in breach. Field-pieces are in general made of brass, or rather of gun-metal, which consists of from 8 to 10 lbs. of tin to 100 lbs. of copper; the largest proportion of tin being used for mortars. The ordnance under description is usually divided into three classes, viz. field guns, artillery of the park, and horse artillery. The field guns include all light pieces attached to regiments of the line, which they accompany in all manoeuvres, to cover and support them. The following natures of field ordnance are attached to battalions of infantry, by the different powers in Europe:

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Batteries</th>
</tr>
</thead>
<tbody>
<tr>
<td>French</td>
<td>two 4-Pounders per battalion</td>
</tr>
<tr>
<td>English</td>
<td>two 6 lbs.</td>
</tr>
<tr>
<td>Danes</td>
<td>three 6 lbs.</td>
</tr>
<tr>
<td>Austrians</td>
<td>two 6 lbs.</td>
</tr>
<tr>
<td>Prussians</td>
<td>two 6 lbs. in the 1st line</td>
</tr>
<tr>
<td>Hanoverians</td>
<td>two 6 lbs. in the 2nd line</td>
</tr>
</tbody>
</table>

The artillery of the park is composed of every class of field ordnance. It is intended to form batteries of position, that is to say, to occupy advantageous situations, independent of the movements of the troops, but with the view to support them, and to produce the greatest effects. Sometimes the park is divided into the several parts of the line; sometimes it is advanced under cover of cavalry, which,
which, suddenly retiring, at a proper moment, unmask the battery, and surprise the enemy by the fatal disclosure.

The park should be sufficiently numerous to afford supplies in the event of any pieces being taken by the enemy; but, on the other hand, it is bad policy to burden an army with too large a train, which not only occupies a great length of line, which in some instances exposes the whole to injury, but demands too large a flock of forage for the horses, &c. as to occasion considerable inconvenience on the score of provisions. The common rule is, to attach to the park twice as many field-pieces, of various natures, as there may be battalions of infantry in the army. The most approved proportions are these: 2 fifths of the whole to be 12-pounders; 2 fifths to be 6-pounders, and 1 fifth to be 3-pounders. But in different countries it is found necessary to lower the establishment to the following standard; viz. only 1 fourth to be 12-pounders; 2 fourths to be 6-pounders, and 1 fourth to be 3-pounders. For every 100 pieces of cannon it is supposed that four howitzers should be added; but we generally see a much larger proportion of the latter; perhaps as far as 15 or 20 to the 100: the French even exceed that proportion, and class their field-pieces into 12, 8, and 4-pounders; which, as their pound weight exceeds our's considerably, their ordnance may be rated at about 1 fifth heavier than the British.

**Horse artillery.** — In the French service this consists of 8-pounders, and 6-inch howitzers; a weight of metal requiring the greatest exertions to move with due rapidity, and rather tending to subject this department to delays, or even to capture. With respect to the latter point, the French seem to entertain fewer scruples about relinquishing their ordnance than we do; they rarely make exigence subservient to honour, but look principally to effects; being certain that a few field-pieces may always be supplied from their park of artillery.

The English horse artillery consists of light 12-pounders, light 6-pounders, and light 5½-inch howitzers. It remains to be proved how far this selection is eligible; but, in addition to the foregoing comment on the French establishment, we may perhaps be correct in hazarding an opinion, that, except in the discharge of grape, in which branch the howitzers profess a decided superiority, the French 8-pounders may be considered as very nearly on a par with our 12-pounders; the former weigh only 1 cwt. 3 qrs. 4 lbs.; while the latter amount to 2 cwt. 3 qrs. 4 lbs.; or, upon the new scale now chiefly in use, to 1 cwt. But our medium 12-pounders have only a very small limber-box, lately added, which carries 6 round, and 6 case-shot, with a proportion of small fleurs. They are attended each by two waggons, having the ammunition, generally about 150 rounds, divided equally between them. The light 6-pounders carry 34 round and 16 case-shot in their limbers, and for each pair of guns about 260 rounds of forts in one waggons. The 5½-inch howitzers carry 22 shells, 4 case-shot, and 2 carcas, in their respective limbers, and are attended by two waggons, carrying 24 case-shot, 24 shells filled, and 120 empty, and 4 carcas. The horse artillery pieces have waggons on a peculiar construction, which carry as follow:

<table>
<thead>
<tr>
<th>For 12-Pounders, light, on the limber—12 rounds</th>
<th>4</th>
<th>4 shells</th>
<th>total 52.</th>
</tr>
</thead>
<tbody>
<tr>
<td>do.</td>
<td>in one wagggon</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>do.</td>
<td>in one wagggon</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>For 6-Pounders, light, on the limber—12 rounds</td>
<td>6</td>
<td>total 156.</td>
<td></td>
</tr>
<tr>
<td>do.</td>
<td>in one wagggon</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

The British parks of artillery are composed of the following ordnance; medium 12-pounders, 4; Desaguliers's 6-pounders, 4; and light 5½-inch howitzers, 4. These are called brigades, according to their respective calibres, or natures; each brigade consisting of 4 or 6 pieces, with a reserve of about 5th of the whole number, which should be placed behind the front line; but if the front be extensive the reserve must be divided.

All field pieces are mounted on carriages, standing on one pair of wheels five feet in height, and when travelling have their trails, or rear, (which then precedes the gun itself,) hooked up to the rear of the limber, or carriage, on equal fixed wheels, allowed to the conveyance of the ammunition in chests; thence called limber-boxes.

**Field-Staff**, is a staff carried by the gunners, in which they screw lighted matches, when they are on command; which is called arming the field-staffs. See **Linstock**.

**Field-Marshal**, is the denomination of the modern military rank in England, but superior to all others; having the chief command of the whole army.

**Field Officers.** See **Officers**.

**Field of Vision**, in **Optics**, is that conical space indefinitely extended before us, so as to include all objects that can be seen at one view, or without turning the eyes. The precise limits of this space are not easily ascertained. In looking at a small distance, we have an imperfect glimpse of objects through about the extent of a hemisphere, or at least for above sixty degrees each way from the optic axis; but towards the extremity of this space objects are very imperfectly seen; and the diameter of the field of distinct vision does not subtend an angle of more than five degrees at most, so that the diameter of a distinct image on the retina is less than .06 of an inch; but it is probably much less. See **Vision**.

**Field Pigeon, in Ornithology**, the English name of a bird of the thrush kind, called by authors Turdus pilaris, which feé.

It is a bird of passage, and visits us in England toward the end of autumn in small flocks, and leaves us in spring; it is not certainly known where these birds breed. They feed on berries, particularly those of the holly, and are well tailed birds.

This bird is easily taken with water bird-line in the following manner: take out a gun, and kill two or three field-fačes with it; by that time the gun has been discharged two or three times, the rest of these birds will be so frightened, that there will be no coming near them; then tie one or two of those that were shot to the upper branches of a bushy tree, in such manner, that they may seem alive and fitting there. Then prepare two or three hundred twigs, covering them well with the water bird-fare, made warm for that purpose; take a good brochen bough, and in that place all the twigs; tie this fast to the tree, just underneath where the other field-fačes are tied, and let this be in a place
FIELD, ENRY, in Biography, a distinguished writer, was born in 1709 at Sharpnam, near Glaistonbury in Somersetshire. After receiving the rudiments of education at home, he was removed to Eton school, where he laid in a respectable stock of classical learning. From Eton he went to Leyden, where he studied the civil law, but soon after his return he commenced writer for the stage. His first piece was a comedy, entitled "Love in Several Mafks," and the success which he obtained in this instance led him to make numerous efforts in the same way; but his early comedies are all forgotten; many of them were little more than translations from the French.

At the age of about twenty-six, or twenty-seven, he married a young lady of great beauty, and with some fortune, which, with what he obtained by the death of his mother, put him in possession of an estate of rather more than $200 per annum. With this fortune he assumed the style of a country gentleman, with a retinue of servants, horses, and dogs. In three years he had exhausted his property, and involved himself in considerable difficulties. He now resolved to study the law, with a view to future support, and entered himself in the Temple. While he was keeping the terms required, he supported himself and family by his pen. He wrote for the stage, and published many essays which displayed a fond of good sense, and acquaintance with mankind. His first attempt at the humorous and satiric delineation of character, was in the "HisUory of Jonathan Wild," which displays a familiarity with the scenes of low profligacy, which it is wonderful that a person in decent life should ever acquire; but his early courts laid the foundation of too much knowledge of this kind. In 1742 he published his first proper novel, entitled "The History and Adventures of Joseph Andrews, and his friend Mr. Abraham Adams." The scenes introduced in this piece are chiefly those of low life: the grave Cervantian humour is imitated, and the principal character, parfon Adams, is moulded on the Quixote of the piece. His success as a novel-writer was not favourable to his professional pursuits, and he did not attain to any considerable eminence at the bar. He received little emolument from his legal practice, and his other supplies were inadequate to the demands of his family. In the midst of anxious cares and broken health, he had the misfortune to lose his wife. By this stroke he was so far overwhelmed as to be unequal to all exertion. At length, the love of liberty and the cause of Protestantism re-animatéd his soul, and, in 1745, during the rebellion, he wrote and published a periodical paper, entitled "The True Patriot," which was followed by "The Jacobite Journal." These efforts in favour of the government and constitution, obtained for him the appointment to the office of Middlesex magistrate, in the discharge of the duties of which he was very exemplary, and took every method for preventing crime, and for improving the police. In 1749 he published "A Charge to the Grand Jury," containing an accurate account of the administration and particular duties of grand juries. This was followed by an "Enquiry into the Causes of the late insurrection of Robbers," and a letter to the lord chancellor Hardwicke; and by "A Proposal for the maintenance of the Poor," both these pieces were esteemed judicious and useful performances, and as exhibiting much diligent research into difficult subjects. While he was thus employed in the serious avocations of his magisterial office, he found leisure to write his "Tom Jones," which must ever be regarded as a master-piece of art, replete with the most striking delineation of manners, and exhibiting extraordinary skill in managing the intricacies of a plot so as to wind up with the happiest effect. His third novel was entitled "Amelia," which came out in 1751; after the publication of this his constitution began to give way very rapidly, but the powers of his mind were still in high vigour, and he engaged in a new periodical work, entitled "The Covent Garden Journal," which continued with much success for about a year, when the author's ill-health obliged him to suspend his literary labours. As a last resource, he was advised to try the climate of Portugal, but the voyage did not contribute to his recovery: he lived long enough to describe the occurrences which he had witnessed in passing from London to Lisbon, and died October 8th, 1749, in the forty-eighth year of his age. Fielding was possessed of many fine virtues of the heart, and the powers of his understanding were unquestionable. His novels, though liable to objections, afford many valuable moral leons. His manners are often drawn from low life, and display too much of the vices and crimes of mankind, yet they are relieved by a considerable admixture of nobler matter, and contain many affecting pictures of moral excellence. His fame as a writer has not declined since his death. He is still regarded as much at the head of the department of comic romance as Richardson is at that of the sentimental. His father, Sarah Fielding, is known for two novels, entitled "David Simple," and "The Cry," and for a translation of the "Memorabilia" of Xenophon: and his half-brother, sir John Fielding, was long at the head of the public office, London. Biog. Brit.

FIÉLDEWEER, in Geography, an island near the W. coast of Norway, about 22 miles long and 4 broad, with a town. N. lat. 63° 33′.

FIÉLSÅ, a town of Swedish Lapland; 45 miles S.S.E. of Aetsa.

FIÉNA, a town of Persia, in the province of Irak; 5 miles S.W. of Cahan.

FIÉNVILLE, in Geography, a town of France, in the department of the Somme; five miles S.W. of Doullens.

FIÉNS, or FIÉNS, THOMAS, in Biography, a physician of eminence in the sixteenth century, was born at Antwerp, where his father exercised the same profession, on the 28th of March, 1557. He pursued his medical and mathematical studies at Leyden, and afterwards at Bologna, which he visited in 1580. On his return to his native country his talents were soon made known: in 1593 he was invited...
to Louvaine, in order to fill one of the vacant professorships of medicine in that university, in which he took the degree of doctor about the end of that year. He resigned his chair after seven years of residence in that school, and went to Munich, having been appointed physician to Maximilian, duke and afterwards elector of Bavaria; but he returned to his poll at the end of one year. In 1616, he was offered the professorship of medicine in the university of Bologna, with a salary of a thousand ducats; but the archduke Albert immediately increased his salary at Louvaine to the same sum, in order to do away the temptation of leaving that city. Accordingly he remained there until his death, which occurred on the 15th of March, 1617, at the college of Brougham, of which he had been for a long time professor. Fienus has been ever regarded as an intelligent and able physician; he had few equals among his contemporaries in the knowledge of natural history and surgery; not to mention his acquaintance with the Greek, and mathematics. His works likewise contributed greatly to advance his reputation; they were as follows. 1. "De canteribus Libri quinque," Louvaine, 1598. 2. "Libri Chirurgiae XII., de praecipuis Artis Chirurgiae controversiis," Francfort, 1602. This work, which passed through many editions, treats of the principal surgical operations. 3. "De viribus Imaginacionis Traetatus," Louvaine, 1628. 4. "De Cometa anni 1618," Antwerp, 1619. In this tract he combats the opinions of Copernicus regarding the motion of the earth. 5. "De vi formatoric hastis Liber, in quo ostenditur animam rationalism infundii tertiis die," ibid. 1620. This work was attacked by Louis du Gardin, a professor of Douai, who maintained the better ground in the undeterminable argument. Fienus replied in a. "De formatoris hastis adversus Ludovicum du Gardin, &c.," Louvaine, 1624. His opinion was at last impugned by Santa Cruz, the physician of Philip IV. which produced, 7. "Pro fun de animacione Fictus tertii die opinione Apologia, adversus Antonium Ponce Santa Cruz, Regis Hispaniarum Medecim Cubilecumare, &c.," Louvaine, 1629. 8. "Semiotics, sive de signis medicis Traetatus," Leyden, 1664. The father of the preceding, Dr. John Fienus, published a treatise at Antwerp in 1582, entitled, "De Platibus humanum corpus molellantibus Commentariorum novus ac fingularis," which passed through many editions. Eloy. Dict.

FIERAS, in Geography, a town of Sweden, in the province of Aebland; twelve miles N.N.W. of Wardberg.

FIERI FACIAS, in Law, a judicial writ, which lies at all times within the year and day, for him that hath recovered in an action of debt and damages; it is directed to the sheriff, commanding him to levy the debt and damages on him, against whom the recovery was had. This species of execution is called fieri facias from the words in it which command the sheriff, quod fieri facias de bonis, that he cause to be made of the goods and chattels of the defendant the sum or debt recovered. This lies as well against privileged persons, peers, &c., as other common persons; and against executors or administrators with regard to the goods of the deceas'd. The sheriff may not break open any outer doors (5 Rep. 92.) to execute this writ; but must enter peaceably, and may then break open any inner doors, belonging to the defendant, in order to take the goods. (Palm. 54.) And he may fell the goods and chattels, even an estate for years, which is a chattel real (8 Rep. 171.) of the defendant, till he has raised enough to satisfy the judgment and costs: first paying the landlord of the premises, upon which the goods are found, the arcents or rent then due, not exceeding one year's rent in the whole. (Stat. 4 Ann. c. 14.) If part only of the debt be levied on 2 fieri facias, the plaintiff may have a copy of satisfacientium for the residue. (1 Roll. Abr. 904. Cro. Eliz. 344.) See Execution.

FIESCO, JOHN LEWIS, in Biography, count of Lavega, a noble Genueso, was born in 1525. He became possessed of a large estate at the age of eighteen, and, surrounded with flatterers, began, at their suggestions, to aspire after that power and distinction in the state to which his birth and opinion formed to entitle him, but from which he was precluded by the superintendency of the Doria family. (See Doria, Angelo.) Fiesco, who possessed all the talents proper to ingratiate himself with a party, resolved to attempt a revolution in Genoa which might raise him to the station that Doria now occupied. His courteous manners rendered him a favorite with the people. He obtained the interest of the court of France, and the concurrence of the Pope, who accommodated him with some galleys. Notwithstanding the preparations that he was making, Doria did not, and would not, suspect anything to the prejudice of Fiesco, though the destruction of himself and family formed an essential part of the conspiracy. The day fixed for the bloody enterprise was January the 2d, 1547, and, on the preceding morning, Fiesco prepared a galley under the pretext of a cruise against the corsairs, and then paying a visit to Doria, he requested permission to depart early from the harbour, and took his leave with much apparent respect, and every demonstration of affection. In the evening he assembled his adherents, and having exhorted them to join him in an attempt to free their country from its oppressors, he went to make known his project to his wife, who, distraught with the idea of the impending danger, entreated him, on her knees, to desist from his desperate undertaking. He had, however, made up his mind, and was immovable; rushing from her apartment, he exclaimed, "Madam, you shall never see me again, or you shall see every thing in Genoa beneath you." In the dead of night he sailed forth at the head of 50 armed men, surround'd by his fellow conspirators. He dispatched parties to all quarters, and proceeded himself to secure the dock in which the galleys lay. In pulling over a plank, placed between two veldts, it gave way and he fell into the water. The weight of his armour fink him to the bottom, from whence he never rose, and thus, at the early age of twenty-two, his life was sacrificed at the shrine of ambition. The confederates had gone too far to recede with safety; they determined therefore to strike the desperate blow, but the death of their leader was fatal to the attempt. Doria escaped unhurt; the senate recovered its authority, and the family of Fiesco paid the penalty of the crimes of their leader by ruin and proscription; Mod. Unit. Hist.

FIESCO, in Geography, a town of Italy, in the department of the Upper Po; 4 miles E. of Crema.

FIESOLE, GIOVANNI DA, in Biography, 2d historical painter, who was born at Fiesole, in 1507. His real name was Montoroli; from his excellence in painting the expressions of saints and angels, he was also called Giovanni Angelico. He was first placed as a disciple with Giottino; he afterwards became a Dominican friar. His first works of confluence were painted at Florence, by order of Cosimo di Medici; who having built the church and convent of St. Mark, commissioned Fra. Giovanni to paint the Chapter-house, in which he represented, in fresco, on the walls, three subjects. 1st, The Pallion of Christ. 2d, All the Saints, Founders of Religious Orders, weeping at the feet of the Cross, and on the other St. Mark the Evangelist with the Virgin, the three Marys, and Saints Cosimo and Damiano, present at the Crucifixion. Under these, by way of fresco, 

R
he represented a tree, at the foot of which was St. Dominici
co supporting the branches, which in their turn upheld
portraits of all the popes, cardinals, bishops, saints, and
doctors in theology, who were of the Dominican order.
His fame procured him an invitation to Rome from pope
Nicholas V., who employed him to paint his chapel and or-
nament manuscripts. He became so warm an admirer
Giovanni, that he offered him the see of bishop of Florence,
which his humility and poverty of his art, led him to
deny him for himself, and the person whom he re-
commended was installed in his stead. He generally painted
his pictures smaller than life: Vafari speaks of them with
great delight, but they are not of a grand clafs, and are
often defective. He died in 1445, aged eighty-six, hav-
ing been exceedingly industrious, and leaving behind him an
immense number of works, principally at Florence and
Rome.

FIESOLI, in Geography, a town of Etruria, the see of
a bishop, suffragan of Florence, three miles N.E. of
Florence. This is the ancient 
Fezola, one of the twelve cities of
Etruria.

FIFE, a small shrill flute, blown at the side, like a Ger-
man flute. It is in almost every musical band, and in the
labor and pipe driven the dance, the fife and drum animate
the soldiers, particularly in the quick step. The fife has fix
notes, and families two octaves from the lowest D in the
treble, to D in alt. The Swiss fife brought this instrument
into France, after the battle of Marengo under Francis I.;
since which it has been admitted into regimental music,
in preference to the common octave flute, having made its
fife falls from its having a key which the fife 
has not. Lab-
barde.

The fife is an instrument, particularly intended for the
use of regiments, and, in conjunction with the drum,
the only music with which many corps are provided. This
little shrill tube is usually about fourteen inches in
length, and of one piece, though some are made to take
to pieces; but such are not suited to military use: it may be
considered a small kind of flute, especially if provided, as
some are, with a key; but such are rare, the generality
being confined to only fix finger holes, and an embouchure,
or mouth-hole. The want of a key necessarily occasions a
difference in the fingering of many notes; but the compas,
or extent, is about the same as that of the German flute;
namely, from D below the treble staff, to D in alt.; but
all beyond B in alt. are more or less harsh, and cruelly
piercing to a feeble ear. Fifes are made of three several
sizes, denominated A, B, and C, respectively: A being the
largest and deepest toned, and one minor third below concert
pitch; the next size is made to correspond with the B b
of the musical scale, and is generally used when playing with
military bands, using what are called B b clarionets. The
C fifes are those at concert-pitch, and are chiefly used for
the ordinary service of these instruments. Such an affor-
ment requires some vehicle or receptacle; accordingly we
find that where such a diversity is allowed, each fife is pro-
vided with a

Fifes-cafe, which is a tin tube, about twenty inches long,
and three in diameter, having two diaphragms of tin pierced
for the several fifes to pass through, so as to be kept sepa-
rate. There is a tin lid which falls down, and either
locks or is fixed by a spring pin. This case is generally
painted to conformed with the ornaments on the drums of the
regiment, and is slung over the shoulder by means of a cord
with tassels. Though certainly decorative, we cannot but
view this appendage as both useless and extravagant.

Fife-rail, in a Ship, are those that are placed on banisters
on each side of the top of the poop, and so along with
hances or falls. They reach down to the quarter-deck, and
to the flair of the gangway.

FIFE'S Passage, in Geography, a channel in Broughton's
Archipelago, about eleven miles in length and two in breadth.
N. lat. 59° 50' E. long. 233° 11'.

FIFENESS, a cape of Scotland, on the E. of the
county of Fife, with a village of the same name, a ridge of
rocks, called the Cor rocks, extending a considerable
way into the sea, renders the passage of the cape dangerous
to leaven. N. lat. 56° 15'. W. long. 2° 39'.

FIFER, a person who plays on the fife: of these one is
generally appointed to each company of infantry, who, in
company with the drummer, plays to the corps while March-
ing for the relief of guard, or when the arms are carried;
also at the times of beating the reveller, the assembly, the
retreat, the tattoo, and other regular or incidental duties.
The most disagreeable part of the duty of the fifiers and
drummers, consists in the infliction of such punishments as
offenders are sentenced by courts-martial to undergo; in pre-
ference of their companions in arms, occasioning this class
of persons to be often treated with marked odium, and to
receive the opprobrious designation of "Bloody Thumbs."

This term is derived from the stains of blood attaching
to their hands, in consequence of their occasionally firstrate
the several cords of which a cat-o-nine-tails is composed,
and which in the act of floggings are apt to become ent-
tangled, so as to fall heavily upon the delinquent's
shoulders. We cannot let pass this opportunitv of expres-
ing our conviction, founded on the bold authoritv, that
personal punishments are as unnecessary as they are dis-
greecful; and that it is not only very practicable, but has
in many instances been found very effectual, to substitute
moderation for severity, and an attack on the pride of an
offender, for one on his flesh. Under the existing sys-
tem we can never be led to envy the feelings of the fifiers
and drummers of a regiment; nor can we entertain the opinion
that this class of our foldvry will be exempted from these
opprobrious epithets, and these facetious reflections, which
affix a stigma of the most obnoxious description.

FIFESHIRE, in Geography, is a county of Scotland,
almost surrounded by the rivers Forth and Tay, the friths
or estuaries of which nearly form it into a peninsula. The
former river on the south divides it from the Lothians; and
the latter separates it from the friths of Perth and Angus;
on the east it is bounded by the friths of Kinrooth and
Clackmannan; and on the west by the German ocean. The
length is 60 miles by 18 in breadth, comprising about 485
square miles. The rivers by which it is watered, besides
the two already mentioned, are the Eden and the Leven.
The Eden has its rife on the borders of Perthshire, between
the towns of Strathmiglo and Abernethy; and taking a
course of 17 miles due east, falls into the sea in the bay of
St. Andrew's. Though a tide river, its frith is compar-
atively placid, and its fine salmon fishery is greatly annoyed
on this account with the notorious enemies of that fish, the
ploice or seals, which is elegantly alluded to by the poet
Johnstone.

"Arva inter nemoralique umbras, et pescena lata
Lene fluen, vitreis fabritur Eden aquis."

The Leven flows out of Loch Leven, a beautiful lake
of nearly 12 miles in circumference, partially included in the
friths of Fife and Kinrooth, the fertile plain of which forms
its well and northern boundary, and to the east and north
it is overlooked by the towering Lomond hills. These and
other interesting surrounding objects, particularly the royal
residence
residence of the ancient line of Scotch or Pictish kings, will be noticed in their respective places. This river, after running 17 miles in an easterly direction, falls into the sea near the village of Leven. It has frequently been confused, by the admirers of Smollett for his beautifule ode on Leven Water, with a river of the same name in the flight of Dumbarton.

This district anciently formed part of the province invicta Caledonia which name the Romans had given to the country north of the river Tay, previous to their taking possession; for Camden observes, the Tay was the utmost northern boundary of the Roman empire in this part of Britain. Julius Agricola, the last of generals under the world of emperors, Domitian, though he was enabled to penetrate further by inductive invasions, even into the heart of the highlands; yet sagaciously perceiving no benefit could arise by conquering a country, naturally unproductive, and thinly peopled, wisely withdrew his army from what he termed the Barbarians; and to redress retaliations erected a chain of forts across this part of the island, and established the Tay for his hostile frontier. Some Roman remains have been discovered northward in Fife, but many more in those parts of ancient Fifeshire, which now constitute the counties of Clackmannan and Kinross. The face of this part of the country is agreeably diversified; towards the west, it is mountainous, and a ridge of hills extends north-southward nearly the whole of its length, dividing the country into two natural districts; on each side the country gradually falling to the respective friths of Forth and Tay. The low lands exhibit a fine fertile country, the high lands most extensive and beautiful prospects; and both are tolerably well wooded. The two conical hills, called the Lomonds, stand very conspicuous, and are visible out at sea to a great distance. The eastern Lomond, the most regular and beautiful in its shape, is about 1650 feet above the level of the town of Falkland, which stands at its base. On the summit of this hill is a small lake, which has the appearance of a volcanic crater, similar to those described by Spallanzani in his travels through Sicily. The western Lomond is less regular in its form, but has greater elevation; and on the summit is a heap of loose stones, denominated by antiquaries a Cairn.

The natural productions are numerous and varied. The whole of the south side of the county abounds in coal, and the pits are numerous. The western and midland districts produce iron; lead has been discovered in the eastern Lomond, and mines of zinc are profitably worked in the parish of Kembrock. Limestone is abundant, and of an excellent quality; there are valuable freestone quarries, and plenty of marble. The pebbles, much admired for the high polish they take, have been discovered in different places; and various kinds of agate, with rubies of a fine water, highly valued by lapidaries. Agriculture appears to have only occupied the attention of the inhabitants of Fifeshire; and its artificial productions vince a spirit of industry and improvement, topsailed in few parts of Scotland. The property is pretty equitably divided; there being few large estates, and the proprietors in general reside and cultivate their own. From this kind of equitable distribution of land, its value is increased, falling from 25 to 30 years purchase. To enumerate the seats of the nobility and gentry is not a part of our plan; but those of Abergour, Leith, Melville, and Ely, are particularly deserving notice. In several parts of the county are the remains of royal seats; at Dunfermline, Falkland, Kinbourn, and St. Andrew's. These ruins will soon eace to be interesting; for in the words of lord Rochester, "they are in the full perfection of decay." Almost surrounded by the sea, this county is supplied with several good harbours; particularly Dunblane, in the frith of Forth, opposite Leith, which is inferior to none in the island. From the circumstance of the towns principally lying upon the coast, king James VI, compared this county to a grey mantle with a gold fringe. These towns were rewarded by that monarch with peculiar attention, who endeavoured to make them full-fertile to Sit gran and wife design of raising Scotland high in the scale of commercial nations; a rank her natural capabilities enabled her to hold. For this purpose he granted the inhabitants. The priviledges and immunities; and by every inducement encouraged them to cultivate their local advantages. And though many of those priviledges by the nation have been rendered unimportant, yet they remain a standing monument of the just distribution and political ingenuity of the royal gracor. The county lends one member to the British senate. The number of royal burghs or parliament towns, as they are usually called, is thirteen, viz. Cupar, the county town, St. Andrews, St. Andrews, Dunfermline, Dunblane, Kinbourn, Kirkaldy, Dornoch, Peterhead, Auchterarder, Kirkcaldy, Earlsferry, and Craik. Several other, formerly privileged with elective franchise, have lost it, from having been unable to defray the expense of representation, by sending a commissioner to the Scottish parliament. Among this number may be mentioned, the towns of Auchtermuchty, Strathmiglo, Newburgh, Falkland, Kilconquhar, Elie, Earlsferry et al., which, though not very large places, derive notice from their former importance. The county is divided into sixty-three parochial districts, and by the enumeration returned to parliament in 1821, the number of houses was 17,065, and inhabitants 93,744, being 196 upon every square mile; a much greater population than is to be found in any other part of Scotland. In its ecclesiastical distribution it contains one final and four seats of prebendary. The people are variously employed. Many in the salmon, herring, and especially what is denominated the white filthery, which is very productive on this part of the coast; others in digging coals, great quantities of which are carried coalwise, and by the Caledonian canal, to other parts of Scotland. The iron mines employ numbers, the ore of which supplies the Calder, Carron, and other iron works; and still more are engaged in manufacturing linen and cotton cloths; with a kind of the latter, under the name of green cloth, the London calico printers have been long supplied from the markets of Fife. This county anciently constituted an earldom, and the honour was possession by the family of Macduff; a title conferred on the thane of Fife, by Malcolm II. For the services the former had done that monarch, in restoring him to the throne, which had been previously possessed by the usurper Macbeth. This title having become extinct, was recently revived in the Dulls of Braco, lateral descendants of the ancient family. General Statistical Account of Scotland.

FIFTEENTH, Septima, or Quinzieme, an ancient tribute or impost of money, laid upon any city, borough, or other town, through the realm; not by the poll, or upon this or that man, but in general upon the whole city or town.

It is so called, because it was supposed to amount to a fifteenth part of that which the city had been valued at of old; or to a fifteenth part of every man's personal estate, according to a reasonable valuation.

This was imposed by parliament, and every town through the realm knew what a fifteenth for themselves amounted to, because it was always the same; whereas the subsidy, which
was raised of every particular man's lands, or goods, must needs be uncertain.

The fifteenth seems to have been a rate anciently laid upon every town, according to the land or circuit belonging to it. Camden mentions many of these fifteenths in his Brit. ves. p. 171, "Bath geldbat pro viginti hidas, quondo sechra geldbat, &c." And p. 181, "Old Sarum pro quinquaginta hidas geldbat, &c." Which rates are according to Doomsday. But in after-times the fifteenth came to be understood as imposed only on goods and chattels, not on lands. It was first granted by parliament, 18 Edw. I. ves. "Computus quintus de repo regii, an. 15. par archiepiscopos, episcopos, abates, priores, comites, barones, & omnes alias de regno, de omnibus bonis mobilibus concebente." The city of London paid that year for the fifteenth 2860l. 172. 8d. and the above of St. Edmund's 666l. 13s. 4d. which was by computation; and thereupon had all the temporal goods of their district discharged of the fifteenth.

In the 8th of Edw. III. it was reduced to a certainty, when, by virtue of the king's commission, new taxes were made of every township, borough, and city, in the kingdom of England. Westminster, London, and the other great cities, which were, at the time, the fifteenth part of the value of every township, and the whole amounted to about 29,000l; and, therefore, it still kept up the name of a fifteenth, when, by the alteration of the value of money and the increase of personal property, things came to be in a very different situation. So that when of later years the commons granted the king a fifteenth, every parish in England immediately knew their proportion of it; that is, the same identical sum that was assessed by the same aid in the 8th of Edw. III.; and then raised it by a rate among themselves, and returned it into the royal exchequer.

The way of collecting it was by two assessors appointed in every county by the king, who appointed twelve more in every hundred to make a true valuation of every man's personal citate upon which the fifteenth part was levied.

**Fifteenth, in Music, is an interval whose ratio is 14th, or the double octave or replicate thereof = 1224 l. 24 l. + 16 l.; see table of Concord.**

Fifteenth Mot. In an Organ, is a range of pipes, so called because each note therein is tuned a double octave or fifteenth above the diapasons, which are reckoned the standard. In accompanying choral parts in a concert, or in church singing, this fift, the twelfth, the principal, and the two diapasons, are generally used together.

**Fifteenth-Mile Creek, in Geography, a river which rises in Pennsylvania, and runs into the Potomack, in Maryland.**

**Fifth, in Music, is a perfect concord, the next in perfection to the union and octave; in the division of the monochord its ratio is 3:1, that is, the third part of a string is a 5th to the octave of the whole string. (See Monochord and Fundamental Bass.) The 5th is a principal found in the triad or common chord. It is made a discord by the 6th; the 5th is a discord in itself, and must be prepared and resolved. The perfect 5th is seven half notes above the base. It is so perfect a chord that no succession of 5ths with the base, or any of the other parts, can be borne, ascending or descending together.**

R. Peguche has given all the warrantable means of preparing and resolving it as a discord, and for the unwarrantable success of 5ths, see Padre Sacchi delle quinte successe. The 5th of a key, falling to the key-note on the base, being regarded as a full cadence or close, has given birth to France to the denomination of dominant, as it governs or leads to the key-note or tonic of every key. Thus, G is regarded as the dominant of C, and D of G, &c.

The **fifth, or major Fifth, is one of its most important intervals, and the most perfect or agreeable in its harmony of any other interval within the octave; it is usually marked V in writings on the theory of music, and consists of seven of the half-notes of keyd instruments, which have 12 founds in the octave. Its ratio is \( \frac{3}{5} = \frac{37}{5} \times 7^h + 31 \); its common logarithm is .82920574004, and its binary log. = .584962, which is its decimal relation to the octave (1) of which it is nearly the 1/2; it contains 15.635526 major commas, is composed of a major and minor third, and is the complement of a minor fourth to the octave; it is equal to the sum of a major tone and minor fourth, a semidiatonic and a medius femitones, a tritone and major femitone, three major tones and a humor, three aportones and four humors, two major tones, one minor tone, and a major femitone also compose it, (see Quint.) Two circumstances have concurred to render this concord the most proper to be used in the tuning of keyd and figured instruments, first, its great perfection, by which much facility is gained in tuning, and it being the only concord which will bear repeating 12 times in succession (with, or without descending octaves) and each time produce a note answering nearly to the 12 notes in common use, and on the 13th repetition fall very nearly on an octave of the note first started from: which circumstances occasion this concord, tempered in different degrees, to be almost exclusively used in the tuning of instruments. Besides the above, various other intervals bear the names of fifth, as

**Flat Fifth, the semidiatonic of the ancient, or false fifth of some, being less than a tone or major-fifth by the medius semitone, and consists of six half-notes; its ratio is \( \frac{45}{64} = \frac{311}{2} = \frac{311 + 6 f + 27 m}{2} \); its common logarithm is .847035979; its binary log. = .708418, and it is 28.5334 major commas. It is the complement of a tritone, is equal to a minor fourth and a major femitone, a tritone and minor comma, to the difference between two minor thirds and a major comma; a major, a minor, and two major femitones also compose it; and it is the difference between two 4ths, and a III, whence it may be tuned on an organ.

**Sharp Fifth, or diesis defective minor fifth, the superfluos fifth of Tartini, consists of eight half notes; it exceeds the true fifth by a minor femitone; its ratio is \( \frac{24}{25} = \frac{394}{3} + 8 f + 34 m \); its common logarithm is \( 5 \times \log 394 + 8 \times \log 2 + 34 \times \log 3 \); its binary log. = .64 886, and it is 35.02654 commas; it is the complement of the flat fourth; it is equal to two major and two minor tones, and is equal to the difference of a minor fifth and enharmonic diesis, also to 2 VIII - 2 Gtis, 2 5 - 2 3, 2 VI - 2 4ths, or to 1 IIIl; whence it may be tuned.

**Comma deficient Fifth, or lesser Fifth of Holder, and deficient Fifth of others, is less than a true fifth by a major comma, as its name imports; its ratio is \( \frac{37}{35} = \frac{347}{3} + 7 f + 32 \); its common logarithm is .82920577283, and its binary log. = .567024; it is 31.69924 major commas. It is equal to one major, two minor, and one major femitone.
F I F

tone, and to a minor fourth and minor tone; it is also equal to the difference between two 4ths and a 3d, whence it may be tuned.

*Comma-deficient flat fifths,* is an apotome less than a true fifth; its ratio is $\frac{729}{1024} = \frac{3}{2} = 300 \times 6 + 5 + 26$; its common logarithm is $0.3324757 + 0.67$; and its binary log. $= 0.900238$; it is $= 27.5^\pm 0.49028$ major commas. It is the complement of three major tones; is equal to two comma-deficient minor thirds; to two major tones and two limmas; and is also the difference between four Vths and two 4ths, whence it may be tuned.

*Comma-redundant flat fifths,* or greater fifth of Holder, is a major comma larger than a true fifth; its ratio is

$$\frac{539}{405} = \frac{25}{35} = 369 \times 7 + 5 + 85 m;$$

its common logarithm is $0.818735.0905$, and its binary log. $= 0.602881$, it is $= 32.6350.120$ major commas, three major tones, and a major limma; and is the difference between two Vths and a 3d and two 4ths, whence it may be tuned.

*Comma-redundant flat fifths,* or tritome maximum of Euler, also the diminished fifth of four, is a minor limma less than a true fifth; its ratio is $\frac{25}{35} = \frac{5}{2} = 322 \times 6 + 36 + 28 m$; its common logarithm is $0.840375.0920$, and its binary log. $= 0.526068$; it is $= 29.35340$ major commas; it is equal to two major tones and two major limmas, also to two 3ds, whence it may be tuned.

*Disphiclima-deficient fifths,* is a disphiclima less than a true fifth; its ratio is $\frac{25}{35} = \frac{5}{2} = 346 \times 7 + 5 + 30 m$; its common logarithm is $0.829738.7996$, and its binary log. $= 0.565417$; it is $= 31.54068$ major commas; it is equal to the difference between four minor tones and a chromatic clisma; to the sum of a minor fourth and two limmas, to live limmas and two apotomes; to the difference between seven octaves and eleven fifths, or seven minor fourths and four fifths, whence it may be tuned. It is the reducing fifth, or that between the hearing notes, when eleven successive perfect fifths are tuned in an octave.

*Double deficient fifths,* is two major commas less than a true fifth; its ratio is

$$\frac{2189}{3024} = \frac{3}{2} = 355 \times 7 + 7 + 29 m;$$

its common logarithm is $0.549078.7942$, and its binary log. $= 0.549122$; it is $= 30.63512$ major commas, and to a major tone, two minor tones, and a limma; and it is the difference between two Vths and two 4ths, and three Vths, whence it may be tuned.

*Double superperfect flat fifths,* is an apotome greater than a true fifth, and two major commas greater than a flat fifth; its ratio is

$$\frac{4796}{6801} = \frac{3}{2} = 416 \times 8 + 3 + 46 m;$$

its common logarithm is $0.7953899.1241$, and its binary log. $= 0.675695$; its major commas, also to four apotomes and four limmas, to two major thirds and two minor commas; to four major tones; to the difference between eight Vths and four Vllths, or between four Vths and four 4ths, from either of which last, this interval may be tuned.

*Minimum fifths* of M. Henfling, or extreme diminished fifth of home, is exceeded by a true fifth, the quantity of two minor semitones and a major comma: its ratio is $\frac{375}{275} = \frac{25}{18} = 2.75 \times 7 + 5 + 24 m$; its common logarithm is $0.8254763.0675$, and its binary or Euler’s logarithm $= 0.949253$; it is $= 25.06728$ commas; it is equal to the difference between a XTH and three ITDs, whence this interval may be tuned.

Fifth-reduction. Men, in Ecclesiastical History, the denomination of wrong-headed and turbulent enthusiasts, who sprang up in England during Cromwell’s usurpation; and who expected Christ’s sudden appearance on earth to establish a new kingdom, and, acting under the influence of this illusion, they aimed at the subversion of all human government, and were far turning all things into confusion.

*Fig.* In Botany. See Figs.

*Fig.* Indian. See Cactus.

*Fig.* Infernal. See Arumumone.

*Fig.* Pharesobt. See Ficus and Musa.

*Fig.* Marygold. See Mesembryanthemum.

*Fig.* tree. Covinham. See Cactus.

*Fig.-wort,* the common name of a plant of the weed kind, which is frequently met with in pasture lands. The roots are of the oblong knobly kind. The leaves are heart-shaped, cornered, and placed on foot-stalks. The flowers have much resemblance to those of crown-foot, but differ in having the cup divided into three parts only, the petals being about eight in number, and narrower. It is a low plant, which runs very much by the roots, choking up most others which are near it. It has likewise the names of pilewort, leffer centuary, &c. See Scrophularia.

*Fig.* Petrified, in Natural History. Among the numerous pyritic indurations of Shelly island, Mr. Jacob collected two which he thought to be figs; which Dr. Parson afterwards referred to a recent fungus, but perhaps with not much better reason.

*Figs,* in the Materia Medica. They are moderately nourishing, grateful to the stomoch, easier of digestion than any of the other sweet fruits, and soften the appetites of the blood, &c. and accordingly are used in medicine, to make gargariams against disorders of the throat and mouth; and as an ingredient in pectoral decoctions, and in minister electurias. They are also applied externally to soften, digest, and promote maturation.

Figs are dried either by a furnace, or in the sun, having first dipped them in scalding hot lye, made of the ashes of the fig tree. The Latins call them carica; or ficus pallas, when thus dried.

In this condition they are used both as medicinse and food; being both the whole, and cather of digestion, when thus clarified of a quantity of their aqueous and viscous parts.

*Figs,* in Common. The best figs are the produce of Turkey, Italy, Spain, Proponese, &c. The islands of the Archipelago yield figs in great abundance; but they are much inferior in goodness to those of Europe. Yet the Greeks in those islands cultivate them with wonderful care and attention: as making the principal food, and a considerable part of the riches of the country.

They
They have two kinds of fig-trees: the first, called \textit{orquus}, or the wild fig-tree; the second, the \textit{domestic} fig-tree.

The method of cultivating and ripening these figs makes a peculiar art, by the ancients called \textit{caprification} ; often spoken of among them in terms of admiration. Some of the modern naturalists have looked on it as a chimera; but Monst. Tournet has assured us of the contrary, and given us that proof, as he learnt it upon the spot. See \textit{Caprilication}.

\textbf{Figs.}, \textit{in antiquity}, were used in divination. See \textit{Sycomoria}.

\textit{Fig}, in the \textit{Manu.}, is a sort of watt, or spongy excrecence, on the trunk, and sometimes all over the body of a horse. The figs that appear in the trunk or sole make an evacuation of blithing malignant humours, that are very hard to cure. The only effectual remedy for these excrecences is excision.

\textit{Fig.}, \textit{Infal}, in \textit{Natural History}, a name given by the English to the creature called by the French, after Mr. Reaumur, the \textit{fons puceron}, or \textit{false puceron}, from its very much resembling the puceron in external appearance, but being extremely different from it when nearly examined. These insects are, when at full growth, of the bigness of the head of a pin of the largest size, but there are usually found among them several that are smaller, down to such as are scarce peas in size, or even one on a pin. They are found in great plenty on the back, or under-side of the leaves of the fig-tree, but they never are seen in clusters like the puceron.

The body and brest of this insect are green, and the edges of the wings are white, and befit with hairs. This creature has two antennae or horns, which it can exert at pleasure; but they usually are lodged under the furrows of the wings, and are not to be seen, unless the animal be turned belly upwards; the head also is bent downwards, and the eyes seem directed to look at objects only placed under them.

It has six legs, and a fine small trunk issuing from the extremity of the head; this is but short, and is of a lively green; it is terminated by a sharp point, and has a fine brown filament like a hair, which it thrusts out of the body of the trunk at pleasure, and which forms a sort of engine or organ destined to convey into the body the juices extravasated by the wound and fission of the trunk. The creature usually remains in perfect quietness on the leaf on which it is found, but has this peculiarity, in its position, that it is always found with its head reposing upon one of the ribs of the leaf, and its body on the plain part; by this means, the anterior part of the head is raised above the surface of the plain part of the leaf, and the creature can, by that advantage, move its trunk about at pleasure, and fix it into different parts of the leaf, while its body is perfectly still at the time.

These creatures throw off their skins many times in their growth, the furrows marking the places where their wings are, and the protuberances made by their cales are always seen, however young they are examined.

In the months of May and June these insects all become winged, and afford a peculiar species of a four-winged fly, which is remarkable for hopping; but as its hinder legs are not greatly larger than the rest, it leaps but a little way at a time. The body of this fly is green, its wings are bordered with yellow, and its legs are white; it has a touch of the same nature with that of the creature before its winged state, and with this it continues to suck the juices of the leaves of the fig-tree as it did before.

The manner in which these animals propagate their species is not yet known. The puceron, to which they more approach in figure than to any other animal, have always young ones found within them; but these, if examined in whatever state, never have any such appearance, not even as much as eggs being found in them; it should seem that their eggs are too minute for our inspection, but that they are vigorous, not viviparous animals. Reaumur's \textit{Hill.} vol. vi. p. 535.

\textit{Fig.} or \textit{Field.} See \textit{Dolium}.

\textit{Figs.} or \textit{cloth of Othoche.} In the South sea, is a coarse and harsh cloth, of the colour of the darkest brown paper, made of the bark of a tree which resembles the wild fig-tree of the West Indies. This cloth has the quality of retarding water; and the greater part of it is perfumed, and worn by the chiefs as a morning dress. For the method of manufacturing and colouring this cloth, see \textit{Oudia.}


\textit{Fig.} \textit{wood Worm.} In \textit{Natural History}, the name of an insect which feeds on the leaves of the scrophularia, or fig-wort, and which is usually esteemed a caterpillar, but is one of those insects called by the French for \textit{fige} \textit{chenilles}.

\textit{Fig.} \textit{eater.} In \textit{Ornithology}, a name given by Albimus and Latham to the \textit{Motailla nova}, which see.

\textit{Figurolo}, \textit{cape}, in \textit{Geography}, a cape on the coast of Epire, at the entrance of the gulf of Acta. N. lat. 39° 29' E. long. 25° 34'.

\textit{Figurulo}, an island in the gulf of Venice, near the coast of Libria. N. lat. 45° 10' E. long. 13° 43'.

Also, a town of Italy, in the department of the Lower Po, 13 miles N.W. of Ferrara.

\textit{Figeac}, a town of France, and principal place of a district, in the department of the Lot, situated on the Solle; 46 miles N. E. of Montauban. The place contains 6452, and the two cantors 23,800 inhabitants, distributed on a territory of 275 kilometres, in 23 communes. This was originally a Benedictine abbey, founded by Pepin, A.D. 755, and secularized by Paul III. It was formerly a place of some strength, but falling into the hands of the king, during the religious war, A.D. 1612, its citadel and fortifications were demolished. N. lat. 44° 37' E. long. 2° 8'.

\textit{Figer}, or \textit{Fiaju}, a rich and extensive province of Japan, on the W. coast of Ximou.

\textit{Figging}, in the \textit{Manu.}, a kind of east term among dealers in horses for thrusting "a corn" (as they call it) of ginger into the fundament of a horse, or vagina of a mare, at the time of their being led out for flour, for the purpose of producing irritation, and causing them to lift up the tail. The London dealers, it is said, are in general so much in the habit of recurring to this artifice, that they permit no servant to flay a horse without having previously figged him, under a certain forfeit.

\textit{Fighig}, in \textit{Geography}, a town of Africa, situated on the south side of the Atlas, in the country of Biedulgier. The women manufacture woollen cloth of exquisite fineness, much valued in Barbary, and sold at a high price. The inhabitants carry on a great trade with Fez and Morocco, and with the negroes: 240 miles E. S. E. of Mequinez. N. lat. 32° 5'. W. long. 1° 5'.

\textit{Fight}. See \textit{Battle and Engagement}.

\textit{Fight}, in a ship, are the wattle-cloths which hang round about her in a light, to hinder the men from being flayed by the enemy.

\textit{Fight}, \textit{cloaks}, denote those bulk-cloths afo or abaft the ship, which are put up for men to stand secure behind, and fire on the enemy, in case of boarding. See \textit{Close}.

\textit{Fight},
FIGHTING, in the Military Art. Under the head of ENGAGEMENT, we have given a description of the incidents, occurrences in both military and naval warfare, and we have endeavoured to give a popular idea of those fluctuations which must ever be expected to attend every conflict, even where the superior numbers of one party should seem to threaten the other with complete destruction. We shall, in this place, add, that every circumstance tends to render the conclusion of a fight the most awful and most decisive. The cannonade, which generally whets in the conflict, is rarely very destructive, though, as approximation takes place, and that ease or grape-shot are substituted for round-shot, the carnage is certainly increased beyond all proportion. It is nevertheless curious to observe, that even in those late battles in the neighbourhood of Vienna, wherein not less than 800 pieces of ordnance, and full 250,000 men were engaged, for at least 30 hours, in which it is ascribed the Austrians alone discharged more than 5,000,000 of milket ammunition, the killed and wounded (letting the prisoners apart) did not amount to 80,000 men. Consequently not one is forty of the latter took effect; even if we suppose the vast trains of artillery attached to both armies to have remained inactive. But when we consider that a very large portion, commonly two-thirds of the whole number killed and wounded, are struck with cannon-shot of some description, and that of the remainder many are wounded by the bayonet only, we must feel our astonishment excited to the highest pitch at the comparative insignificance of musketry. Such, however, is the fact.

Buff-fighting, which relates to a more delusive and secret mode of opposition, is far more destructive. In this, each individual acts independently as a ruffian; he conceals himself under bunks, behind trees and bushes, and either fires at the enemy, or assaills him with the bayonet, or sword in hand, according as circumstances may demand, the great art being to destroy without being seen. To this kind of hostility all uncivilized nations at first resort, using spears, thongs, swords, and clubs of various descriptions, and particularly using their bows with great dexterity. In general, regular troops are not much employed in buff-fighting, except in close countries, where banditti—harbour, and especially when popular insurrections take place. It is a species of service very trying both to the courage and the constitution, and though even performed in the highest style by our gallant soldiery, is considered by them as a most arduous and hazardous duty.

Prize-fighting, however much it may be upheld by amateurs, as conducive to the support of a certain kind of courage among the lower classes, cannot be noticed by the more enlightened, as tending with barbarity, and often with the most wanton acts of cruelty. The man who, merely for pastime, or as a speculation, can encourage two of his fellow-creatures to enter the lists, and to do all in their power to main, or even to murder each other, must in his heart be a complete ruffian. That every individual should, in these days, be able to defend himself, will not be denied; but, in admitting thus much, we pass a most severe censure on the dispositions of those who are too often indiscriminately termed peaceable citizens, and who, we are apt to think, if left induced by a certain kind of emulation, towards which prize-fighting greatly contributes, might perform their several duties in life, and pass each other in the streets without either provoking others, or pretending to have received insults from others of a more praiseworthy disposition.

Without attempting to enter on their merits in other respects, as we relieve ourselves for a full exposition of their principles in its proper place, we cannot refrain from remarking that the policy, as well as the good policy, of refraining from blows, is conspicuously proved by that clafs of difcuttents generally called quakers.

FIGHTING ISLAND, in Geography, called by the French "Grofl lile aux Dindes," lies about four miles below Detroit (which see); it is valuable for pasture, but has very little wood. In the summer the Indians make it a place of encampment, and some of them plant a little corn.

FIGHTWITE, FITHWITA, in the Saxon times, signified a mulet for making a quarrel, to the disturbance of the peace. "Multa ob commodiam pugnam in perturbationem pacis, quae in exercitu regis 10 foldorum erat." Blount and Jacob, in transcribing this passage, have inserted 120 foils.

FIGI, in Geography, a town of Japan, in the island of Xano; 10 miles N. E. of Funai.

FIGIN, a river of Norway, which runs into the North sea, to miles S. of Stavanger.

FIGLNAE, in Ancient Geography, a town of Gallia Narbonensis, marked in the Itinerary of Antoinette between Valence and Vienne.—Alfo, a town of Gaul, belonging to the Allobroges, situated upon the left of the Rhone.

FIGMAN, in Geography, a town of France, in the department of the Upper Garonne; 7 miles N. N. W. of Toulouse.

FIG-TREE BAY, a bay on the N. E. coast of the island of Jamaica. N. lat. 18° 18'. W. long. 76° 29'.—Alfo, a bay on the W. coast of the island of St. Christopher, near Sandy Point.

FIGUERAS, a town of Spain, in Catalonia, containing 4000 inhabitants, where the Spaniards, in 1176, began to erect a fortress, which they designed should be impregnable. It was to contain quarters for 150 companies of infantry, with 500 horse, apartments for 60 officers, with suitable accommodations; one long range of magazines for provvisions, and four for powder. The works were made bomb-proof. The glacing is for the most part formed of the rock, and the whole is protected by proper bastions. It is said that 12,000 men are sufficient to defend these works. Nevertheless, the place was taken by the French in 1794; three leagues from Janquera, and seven from Gerona. The adjacent country is agreeable; the hills are shaded with evergreen woods; the plains are well cultivated, and divided by hedges of aloes and wild pomegranate. The road from hence to Gerona is diversified with gentle eminences and fruitful plains. Two of these hills exhibit some volcanic appearances.

FIGUERO-DOS-VINHOS, a town of Portugal, in the province of Eltrcumadura, situated near some lofty mountains, on a small river, which runs into the Zêzere; celebrated for its wine: 20 miles north of Thomar.

FIGURA, in Mystic. See Figure.

FIGURAL, or Figurate numbers, such as do or may represent some geometrical figure, in relation to which they are always considered; as triangular, pentagonal, pyramidal, &c. numbers. See Numbers.

FIGURATE, or Figurative, that which has a relation to figure, or that teaches under some obscure resemblance. Thus a figurative style is that which abounds in figures. (See Figure and Style.) The figurative style, F. Bouhours observes, is neither the most just, nor the best. For this reason Cicero directs us to the ancients, who not having yet be thought themselves to use figurative expressions.
but keeping to the most proper and natural way, have almost all wrote well. "Sunt enim illi veteres, qui nondum ovare potentat et, quae dicibant, omnes prope praelae locuti."

Long since, say the grammarians, renders that proper in all languages, which at first was figurative. The same thoughts appear more lively when expressed by a figure, than when in simple terms. The reason is, that figurative explications denote not only the principal matter, but also the emotion and passion of the person who speaks.

**Figurative is also much used in speaking of the mysteries and figures of the old law.** In this sense manna is said to be figurative of the eucharist.

**Figurative is also used in the Greek grammar for what we otherwise call characteristic, viz., a letter that characterizes certain tenses of the Greek verbs; or that distinguishes and specifies them.**

In the first conjugation of the barytonous verbs, the σ is characteristic, or figurative of the prater tense, and the ἄ of the future.

**Figurative, or Figurative counter-points, in Music, is that wherein there is a mixture of discordants along with the concords.**

See **Counter-point and Supposition.**

Where the discordants are used as a solid and substantial part of the harmony, the counter-point is properly called the harmony of discord.

**FIGURE, FIGURA, in a general sense, denotes the surface of terminating extremes of a body.**

All bodies have some figure; whence figurability is generally ranked among the essential properties of body or matter. A body without figure would be an infinite body.

The corporeal philosophers account for every thing from the figure, bulks, and motions of the atoms, or primary corpufcles of bodies.

For the figure of bodies, considered as objects of sight, see Vision.

The schoolemen dispute whether or no the quality of figure be the same with that of form; and if they differ, what it is that constitutes the difference? Boethius will have figure only predicated of inanimate bodies, and form of animate. Others extend figure to all natural things, and form to all artificial ones; whence the verbe, "Ferman viventis, piæti dic esse figuram."

Others apply figure indifferently to all kinds of bodies, but not in all relations. If only the bare circumference, or circumference, be considered, they call it figure; but if the circumference be considered as endowed with colour, they then call it form, which see.

**Figure of the Earth and Planets.**—This subject has been so fully treated under **Degree and Earth,** that very little remains to be said in this place. The general spherical form of the earth seems to have been known in ages of the most remote antiquity, but this knowledge was often concealed only to philosophers and mathematicians, during the middle ages, the doctrine was even disputed, and the spherical figure denied by some of the fathers of the church; and it is only since the revival of learning in modern Europe that it has been universally received and acknowledged by every class of people. It is now nearly 200 years, that the first mathematicians of Europe have directed their particular attention to the exact determination of the real figure of the earth; an historical account of these labours, and of the refult obtained from them has already been given under the articles above mentioned. Since these were written, the measurement of the arc of the meridian has been continued in our own country, and our continental neighbours have likewise occasionally published some additional documents, relative to their great survey. Nothing however has occurred to alter any of the principal refults which we have given; every thing seems to confirm the opinion, that though the mean figure of the earth approaches very nearly to the spheroid, whose ellipticity is 1/240, yet that the irregularities in the densities of the different masses are very great, so as to render all the partial measurements entirely unsatisfactory. Europe, in general, appears to be much flatter than according to the general form; other parts of the globe must of course be more protuberant; but observations are still wanting to enable us to pronounce in what manner these irregularities are distributed, so as to compensate each other; nor can we flatter ourselves this question will soon be determined, considering the uncivilized state of the great portion of the globe, compared with that requisite to conduct the operations necessary for these investigations. It appears that the project, once entertained, of determining the exact difference of latitude and longitude by geodetical measurement, must now be abandoned, or at least confined to very small tracts of country, as the errors of astronomical observation, when well conducted with perfect instruments, are less than those which arise from the irregularity of the earth's figure. This observation, however, only applies to particular cases, where extreme accuracy is required; for, in general, the situation of places, determined by national survey, is always extremely near the truth, and the limits of error may almost always be known. Our knowledge of the natural history of the earth has not yet been very materially improved by the investigations which have been made relative to its figure. It does not appear that the earth has ever been in a state of entire fission or fluidity, for then it would probably have taken a more regular figure; yet it approaches much nearer to the figure ascribed by theory than could have arisen from the crumbling of its solid particles, as some have supposed. This intermediate state seems consistent with the information derived from our chemical knowledge, and other sources of information. Though a satisfactory solution of these difficulties is at present beyond our reach, yet science is advancing towards this object with rapid strides, and many years will not probably clasp before the mystery is removed, that at present obstructs our searchings into the original nature and constitution of the earth.

**Figure of the Planets.** See the planets respectively.

**Figures, in Architecture and Sculpture,** denote representations of things made in solid matter; thus it suits, figures, &c. Thus we say, figures of brass, of marble, of itouco, of plaster, &c.

But, in this sense, too, the term is more usually applied to human representations than to other things. Thus we say, an equestrian figure, for a man on horseback. Daviler observes, that these, either represented sitting, as popes, &c. or kneeling, as on monuments, &c. or laid along the river, &c. are more properly called figures than statues.

**Figures, in Architecture, are said to be detached, when they stand singly, in opposition to those compositions which are called groups.**

**Figures, in Arithmetic, are the numeral characters; or the characters whereby numbers are expressed, or written.** Thus the number of four hundred and fifty is written, or expressed, by three figures, 450.

The figures in arithmetic are the nine digits; 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0.

These figures were first brought into Europe by the Moors of
of Spain, and into England, as Dr. Wallis apprehends, about 1150. See Arithmetic and Character.

However, from some ancient dates, supposed to consist wholly or in part of Arabian figures, some have concluded, that these figures originally Indian, were known and used in this country at least as early as the tenth century. The most ancient date discovered by Dr. Wallis was that on a chimney-piece at Holmwood, in Northamptonshire, M 133, i.e. 1153. Other dates discovered since, are 1090, at Colchester, in Essex; 1016, with the Roman M for a thousand, at Widgel Hall, near Huntingford, in Hertfordshire; 1011 on the north front of the parish church of Runfold in Hampshire; and 975 over a gate-way at Worcester. Dr. Ward has urged several objections against the antiquity of these dates. As no example occurs of the use of these figures in any ancient manuscript, earlier than some copies of Johannes de Sacro Butofo, who died in 1256, he thinks it strange, that workmen should have made use of these figures to long before they appear in the writings of the learned; and he also disputes the fact. The Helmond date, according to him, should be 1333; the Colchester date 1490; that at Widgel Hall has in it no Arabian figures, the 1 and 6 being I and G, the initial letters of a name; and the date at Worcester, he supposes to consist of Roman numerals, and to be really 1503. Martyn's Abridgment of Phil. Trans. vol. ix. p. 420, &c.

Figure, in Astrology, a description, or draught, of the state and disposition of the heavens, at a certain hour; containing the places of the planets and stars, marked down in a figure of twelve triangles, calledハウス.

This is also called a horn-cup and thence.

Figure of an Eclipse, in Astronomy, represents a representation of the path or orbit of the sun, and the moon, during the time of the eclipse, upon paper; with the number of digits eclipsed, and the beginning, middle, and end, of darkness. See Eclipse.

Figure, or Delineation, of the full moon, such as viewed through a telescope with two convex glasses, is of considerable use in obervations of eclipses, and conjunctions of the moon with other luminaries. In this figure of the moon are represented the macula, or spots, of the moon, marked by numbers; beginning with the spots, which usually enter first within the shade at the time of the great eclipses, and also emerge the first.

Figure, in Copics, denotes the rectangle made under the latus rectum and transversum, in the hyperbola and ellipsis.

Figure of the Diameter. The rectangle under any diameter, and its proper parameter, is in the ellipsis and hyperbola, called the figure of that diameter.

Figures of Plants, since botany became a study, have come into general use to promote a knowledge of the various species and genera of the vegetable kingdom. The oldest drawings of plants of which we have any knowledge, are in a manuscript of Dioscorides, in the Imperial library at Vienna, of which we have already given an account. (See Dioscorides.) These are supposed to be as ancient as the third century of the Christian era, and serve at least to show what was understood concerning the plants of this writer at that period. After the invention of printing, figures of plants were very soon introduced into botanical or medical books, and were at first cut on wooden blocks, and printed in the pages of letter-press. Fabius Columnus, in his Phytobosanum, published at Naples in 1592, gave the first copper plates of plants. We know not exactly how from the practice began of colouring the figures in books; but from some copies of Dodoens and Tragus in our possession, it appears to have been usual about the middle of the 16th century. The above-mentioned drawings at Vienna are coloured, but in the rudest possible style. Engravings in botanical books were not coloured till the early part of the 17th century. Boller's Hortus Eystettensis, published in 1615, was perhaps one of the earlies; but it is always difficult to say whether such works were actually published coloured, or whether, as often happened, they were painted subsequefly by some of their possessors. All these old works were painted by hand, and not printed in colours. This last method was first introduced, we believe, by the late professor Martyn, in his splendid Historia Plantarum rariorum, published at London in 1728, the drawings of which came from no less a hand than Van Huysem. But the execution of the plates in mezzotinto, and the colouring, are far inferior to the apparent merit of the drawings. The French at present excel in this art of printing in colours, as may be seen by the exquisite publications of Redouté and Ventenat, to mention others of birds and quadrupeds. Bullard led the way in his Herbariæ de France, which is now far excelled by other similar works in this respect. Nor are the French less eminent at present in their engraved uncoloured botanical figures. Some admirable performances of this kind appeared in the reign of Louis XIV. In our days the works of Hérault have justly been admired, and are now even excelled.

In Germany and England the greater part of botanical plates are fine engravings, coloured by hand, though some of Dr. Thornton's figures, and those very well executed, are printed in colours. The German figures are usually altogether deficient in picturesque beauty, or colouring, properly called, but are expressive, and tolerably cheap, so as to be useful to the science. This however can only be said of their best works, some, the second-rate, though popular, ones, being coloured not much unlike the varnished Dutch toys seen at a fair. On the other hand, Germany has produced some exquisitely delicate botanical works in colours, as the Planta Liechensee of Hoffmann, and the cryptogamic works of Schrader and others.

It is much to be wished that the public were not burred with repetitions of the same plant over and over again, at least by authors who publickly profess to publish new ones only. In books defined to exhibit the entire plants of any one country, or exclusively the exotic plants of any particular garden or garden, such a scheme being avowed, there is no imposition. But still the most valuable and respectable are such as figure only entirely new plants, or at most what are badly or erroneousl figured before. If this were attended to, the representations of all known plants might in time be accessible somewhere or other. However perfect the science of botanical definition may have become, few persons are competent to keep it up to its highest standard, who yet may be able to speak to the eyes by a picture. No painting indeed, however excellent, ought to supercede, or be unaccompanied by, descriptions and definitions, which alone render botany a science; for who can argue from a picture? Language is the current coin of rational beings. Nevertheless, the two modes of instruction may advantageously go hand in hand. If every known plant were to be found delineated in some work or other, the study of botany would be much facilitated, and even such an attempt as that of Schilniur of Wittenberg, to furnish an universal set of botanical figures in as compendious a form as possible, merits great praise, though it may be doubted whether the rude colouring of such a work adds any thing to its value, though unfortunately too much to its price. It has often been remarked that the uncoloured wooden engravings of
Brunfelsius, Fuchsius, and a few here and there in other authors, express the plants intended better than many minified plates. Hence outlines of Plummer and other botanists have been published in imitation, but none come near the merit of their prototypes. The truth is, that to make one of those admirable outlines, requires the skill of a first-rate painter, if not a spark of the genius of a Grecian satirist. Hence they are likely to remain unrivalled, as they have hitherto been. Of exquisite precision, without that sublime degree of art, Leers's figures of griffons in his *Flora Hibernica* are matchless examples.

Some persons have attempted, and even published, figures made by an imprefion taken from the dried plant, with printer's ink on paper. These might be supposed likely to prove peculiarly accurate, but they generally fail in execution. They may indeed give the unnatural stiff outline of a dried specimen, but the prominent parts of the surface being necessarily what give the dark and imprefion, they of course totally mislead the eye, and all but the most flender and expanded subjects produce a mass of confusion and deformity.

As we are on the subject of figures of plants, we beg leave to correct an error in our account of *Doreana japonica*. A plate of that shrub is extant in Thumberg's *Flora Polonica, vol. 3*, a work which however indifferently executed, ranks very high for the originality and rarity of its contents.

**Figure.** In *Dancing*, denotes the several steps which the dancers make in order and cadence; confidered as they mark certain figures on the floor.

**Figure.** In *Fencing*, are the divers guards, poftures, attitudes, or dilpofitions, of the body, arm, or fword. See Fencing.

**Figure.** In *Fortification*, is the plan of any fortified place; or the interior polygon, &c.

When the fide and angles are equal, it is called a regular; when unequal, an irregular figure.

**Figure.** In *Geometry*, is applied to the extremities of points, lines, or numbers, thrown or cast at random; on the combinations or variations whereof the fages of this art found their fantatical divinations.

**Figure.** In *Geometry*, denotes a surface inclosed, or circumfcribed with one or more lines.

Such are triangles, figures, polygons, circles, ellipses, &c.

Wolfius defines figure a continuum terminated by a perimeter. In which fente figure is applicable both to superficiies and folds. In the former case, the perimeter is of lines; in the fecd, of surfaces.

Figures are either rectilineal, curvilineal, or mixt, according as the perimeter consists of right lines, curve lines, or both.

The superficial parts of a figure are called its sides; the lowest side, its base; and the angle oppofite to the base, the vertex.

The height of a figure is the dilance of the vertex from the base.

**Figure.** In *Grammar*, is an expression that deviates from the common and natural rules of grammar; either for the fake of elegance or brevity. The best grammarians only reckon four figures; the ellipse, pleonasm, fyllipse, and hyperbation. Others add two more; viz. antipofhip, and enallage.

**Figure.** In *Heraldry*, a bearing in a shield. Of these figures there is almost an infinite variety: some are natural; such as the celestial figures of the sun, moon, stars, &c. and their parts; the effigies of men, women, &c. and their parts: animals, as lions, flags, foxes, boars, &c. and their parts; birds, as eagles, swans, birds, pelicans, &c. and their parts; fishes, as dolphins, whales, griffins, trouts, &c. and their parts; reptiles, and insects, as tortoises, serpents, graffhoppers, &c. and their parts; vegetables, as trees, plants, flowers, herbs, &c. and their parts; and flowers, as diamonds, rubies, poftebles, rocks, &c. These charges, as well as ordinaries, have divers attributes or epithets, which express their qualities, positions, and dilpofitions. Thus, the sun is faid to be in his glory, eclipsed, &c.; the moon in the complement, in crescent, &c.; Animals are faid to be rampant, pajfive, &c. Birds have also their denomi- nations; fishes are decribed to be bountift, natioit, &c.; Befides these natural figures, there are also artificial figures; the principal of which are warlike instruments, as swords, arrows, battering rams, gauntlet, helmets, spears, poleaxes; ornaments used in royal and religious ceremonies, as crowns, coronets, mitres, wreathe, crofiers; towers, caille, arches, columns, plummets, battlements, churches, columes, curtains, borrowed from architecture and fortification; and ships, anchors, rudders, pendents, fins, oars, masts, flags, gallows, lighters, &c. derived from navigation; all these figures have different epithets denoting their position, structure, &c.

There are likewise chimerical or imaginary figures used in heraldry, that are the refult of fancy and caprice: fuch as centaurs, hydras, philomacs, griffons, dragons, &c. Ponies, p.v. *Elen* Herald, p. 131, &c. 172, &c.

**Figure.** In *Logic*, denotes a certain dilpofition of the terms of a fyllogism; particularly of the middle, with regard to the extremes.

Hence it follows, that there are as many figures of fyllo- grims, as there are different connections of the extremes with the middle; so that, though the schoolmen ordinarilv only reckon three, yet a fourth might be admitted.

In the first figure the medium or middle term is the sub- ject of the major proposition, and the predicate of the minor. This contains four moods, and applies to the proof of all sorts of questions, whether universal or particular, affirmative or negative. In the second figure the middle term is the predicate of both the premises, and this con- tains four moods, admitting only of negative conclusions. The third figure requires that the middle term be the sub- ject of both the premises, and has fix moods, admitting only of particular conclusions. The special rules of these three figures are the following: in the first, the major proposition must always be universal, and the minor affir- mative; in the second also the major must be universal; and one of the premises, together with the conclusion, must be negative; in the third figure the minor must be affirmative, and the conclusion always particular.

In the fourth figure, called by the Peripatetics the inde- close, and by others the Galenical figure, as varying too much from the natural form, the middle term is predicated to the major proposition, and subjected in the minor. Some logicians will allow this to be nothing else but a mere inverion of the first figure. It has five moods. Watts's *Logic*, part iii. chap. 2. 3.

**Figure.** In *Manufactures*, is applied to the various defigns represented or wrought on velvets, damasks, taffete, laces, catties, and other flufs and cloths.

The most usual figures for such defigns are flowers, imi- tated from the life; or grotesques, and compartments of pure fancy. Representations of men, beasts, birds, and landscapes, have only been introduced since the tafle for the

Chinice
Chinese stuffs, particularly those called furnes, began to prevail among us.

It is the wool of the fluff that forms the figures; the warp only serves for the ground. In working figured stuffs, there is required a person to move the workman how far he must raise the threads of the warp, to represent the figure of the design with the wool, which is to be paffed across between the threads thus raised. This fome call reading the design, which fee.

For the figures on tapestry, brocade, &c. See Tapestry, &c.

For thofe given by the calenders, printers, &c. See Calendar, &c.

Figure, in Muft. In general, figure includes all the characters used in music to express sounds, their place in the scale, with their duration and equivalent reffs: whence contrapunto figurate, to dilftime it from contrapunto fimplices, plain counterpoint, which Zarlino defines common chords of note against note, all of the fame length, and without difcourfe. Figurative harmony, fome times called florid counterpoint, is that in which the chords are broken into melody, and exprefied by figures or notes of different lengths. See Time-table.

Figure, Mute; mute figures, in Italian mute, imply reffs, or characters denoting silence.

Figure, Apparent, in Optics, that figure, or fhape, which an object appears under when viewed at a distance, being often very different from the true figure; for a straight line viewed at a distance may appear but as a point; a furface as a line; and a folid as a furface; and each of these of different magnitudes, and the two last of different figures, according to their situation with regard to the eye. Thus an arch of a circle may appear a straight line; a fquare or oblong, a trapezium, or even a triangle; a circle, an ellipsis; angular magnitudes, round; a sphere, a circle, &c.

Alfo any fmall light, as a candle feen at a distance in the dark, will appear magnified, and farther off than it is. Add to this, that if several objects are feen at a distance, under angles that are fo small as to be inappreciable, as well as each of the angles subtended by any one of them, and that next to it; then all thofe objects will appear not only to be contiguous, but to confitute and feme but one continued magnitude.

Figure, in Painting and Sculpture, is used to fignify the form, the contour, or outline of the furface of bodies of whatever kind they may be. In conformity with this, we speak of a drawing, as representing the figure of a tree, a house, a book, a horfe, &c. &c. And in sculpture we fpeak of figures of bronze, of marble, of paffer, &c. As however man is the principal subject on which artists who purfue the study of the higher branches of thofe arts are called to exert their talents, the human form is therefore by way of pre-eminencc called the figure.

A picture wherein the representation is given of a great number of men, women, or children, is faid to be full of figures. On the contrary, a landscape wherein there is only the representation of mountains, trees, &c. and not of human beings, is faid to be without figures. For further illuftration fee Human figure.

Figure, is also applied to representations, or images of things in prints, &c.

Some readers chufe to have the figures, efpecially the mathematical ones, in wood, for the convenience of having them immediately annexed to the matter they refer to; others rather chufe to be at the pains of turning over, and having recourse to another part of the book, that they may have the figures more neat and accurate on copper.

The author of a collection of differtations, printed at Paris in 1715, fays, in the firft difertation on the Hebrew medals, p. 66, that the Jews were allowed to make any kind of figures, or images of trees, plants, buildings, flowers, &c. but not thofe of animals, or of the fun, moon, and fars.

Figures, Brimstone. See Brimstone.

Figures, Gafting of. See Gafting.

Figure Circumscribed, and Infcribed. See Circumscribing, and Incribed.

Figures, Equal. See Equal.

Figure, Equilateral. See Equilateral.

Figure, Plane. See Plain.

Figure, Regular, and Irregular. See Regular and Irregular.

Figure, Similar. See Similar.

Figure, in Rhetoric, is a phrase, or turn of speech or difcourfe, more beautiful and emphatical than what is used in common or ordinary speaking. Accordingly it implies some departure from simplicitie of expression; but at the fame time this deviation from what may be reckoned the molt fimple form of speech, by no means supposeth any thing uncommon or unnatural; the cafe is fo far otherwife, that, on many occasions, figures are the molt natural, and the molt common method of uttering our sentiments. Nor should it be imagined that every alteration from the common manner ought to be efteemed a figure, or deviating of that character. It muft contain some beauty, or express some paflion, to merit a place among rhetorical figures, and be marked out for imitation.

Figures, by the Greeks called σχήμα, σχεμα, are the encrements of difcourfe, and we only ufe them when raised and moved with the consideration of something extraordinary.

The term figure, as Dr. Ward obferves, feems to have been borrowed from the flage, where the different habits and geltures of the actors, fuitable to the several characters they fuffixed, were by the Greeks called σχήμα, and by the Latin ftgura. Nor is it unufual with us to fay of a perfon, both with refeft to his drefs and actions, that he makes a very bad, or a very graceful figure. And as language is the drefs, as it were, of our thoughts, in which they appear and are represented to others; fo any particular manner of speaking may, in a larger fense of the word, be called its figure, in which latitude orators fometimes ufe it (see Cic. De Orat. i. iii. c. 52.) but rhetoricians have reftored the fense of the word to fuch forms of speech, as differ from the more common and ordinary ways of expreffion; as the theatrical habits of actors, and their deportment on the flage, are different from their usual garb and behaviour at other times. Or, as the figure or fhape of one body diftinguishes it from another, fo figures are forms of speech, having, each of them, a caft or turn peculiar to itself, which both diftinguishes it from the reft, and diftinguishes it from fimple expreffion.

Simple expreffion juft makes our ideas known to others; but figurative language, more than this, bewows a particular drefs upon that idea; a drefs which both makes it to be remarkead, and adorns it.

Some have erroneously imagined, that figures of speech should be claffed among its chief reneuement not invefted till language had advanced to its later period, and mankind were brought into a polished flate; and that, then, they were devised by orators and rhetoricians. Whereas the contrary to this is the truth. Mankind never employed fo many figures of speech, as when they had hardly any words for expressing their meaning. For, firft, the want of proper names for every object, obliged them to ufe one name for many; and, of course, to expreff themselves by comparison, metaphors, allusions, and all thofe substituted forms of speech.
FIGURE.

Those of the second kind, or such as are fitted for moving and influencing the passions, are Epanorthosis, or correction; Paralepsis, or omission; Parrhesia, or repetition; Anaphora, or enumeration; Exposition, or exposition; Hypothemosis, or imagery; Aspera, or doubt; Aporia, or catachrest; orateis, or Interrogation; exclamation, or Exclamation; Paradoxa, or acclamation; Apeorop, or assertis; Prosopoeia, or the fiction of a person. See each under its proper head.

Of Figures of words, some are tropes, i.e. transitions of words from their proper significations, to some more remote and extraordinary one. See TROPE.

Others are figures of words, more properly so called, and not tropes; being fixed inherent in the words, that upon changing of the words, or sometimes only their situation, the figure is delivered: as in animos pro animis, where the figure would be lost, if not all instances you should put forth.

Thus, to the all figures of life, is in effect to life life; this is lost by changing the order of the words: as, to life all figures of life, is in life life in effect.

The principal of these verbal figures may be arranged into three classes: such as consist in a deficiency of words, in a redundancy, in a repetition. To the first class belong the Pleonasms and Polysemy. The third kind of verbal figures includes those by which the same word in found, or first, is repeated; or one of like found or unit is, or both. Of the second kind in this division there are ten, called Anapadosis, Pneusis, Epanapadosis, Epexegesis, Anadidymia, Epanapadosis, and Epanapadosis. To the second class belong the Paronomasia, the Homoiotetics, the Synonymia, and Derivatio; the two last of which respect words that are similar in sound only, the third in sense, and the last in both.

With regard to the proper use of figures, we may observe, that they should always be accommodated to the sentiments, and rise in proportion to the ideas designed to be conveyed by them; it is also better, in general, to be nervous than copious; that the images, by their closer union, may impress the mind with greater energy, though in such figures as are designed for ornament or illustration, a more diffusive way of painting is sometimes agreeable. The too frequent use of figures should be avoided; and they should be so interwoven in a discourse as not to render the style rough and uneven, sometimes high and at other times low; now dry and jejune, then pompous and florid. In every case they should seem to rise more from nature than art, to offer themselves rather than to be the effect of study. Finally, it should be duly considered, that neither all the beauties, nor even the chief beauties of composition, depend upon tropes and figures. For a further account of the use and effects of figures on language, see Style. See also Mr. Taphor, and each of the articles above noted. Ward's Ont. Lect. vol. i. p. 34.

FIGURES of PROSE comprehend the Syntopha, Ecythelips, Crasis, Syntheses, Diarizes, Systoles, and Diastole. See each article.

FIGURE is used, in Theology, for the mysteries represented or delivered obliquely to us under certain types or actions in the Old Testament.

Thus, anna is held by fome to be a figure or type of the eucharist; and the death of Abel a figure of the suffering of Christ.

Many divines and critics contend, that all the actions, histories,
tories, ceremonies, &c. of the Old Testament, are only figures, types, and prophecies, of what was to happen under the New. The Jews are supposed to have had the figures or shadows, whilst we possess the substance.

Fig. 5. Receptacle cylindrical, clothed with the calyx-leaves. Seed-down none. Female florets among the calyx-scales; perfect ones four-cleft, in the disk.

Fig. 4. Linn. Sp. Pl. 1311. C. f. 1. 36. (Gnaphalium umbellatum minimum; Buhl. Hill. v. 3 p. 162. Exv umbellata; Gartn. v. 2. 393.) Found in the south of Europe, in waste sandy ground, particularly in places occasionally inundated. The root is annual. Stems either entirely wanting, or more or less elevated, solitary or numerous, simple or branched, at most three or four inches high. Whole plant clothed with a white cottony tenuous web. Leaves scattered, ovate or spatulate, entire, many of them surrounding the little heads of flowers in a radiating manner, and making an elegant rosaceous appearance.

Professors Williams now rightly retain this as the only species of Filago, the root being called referred to Gnaphalium. It is also the original one.

FILAMENT, Filamentum, a word though not of classical authority, yet well supported by analogy, is technically applied to the usually flinder thread-like part which unites the anther of a flower; see ANTHER. This part, however, is not essential to all species of flowers, though the anther itself, being the male organ, is so. But the latter in some cases is immediately affixed to the corolla, receptacle, or pilil, on which it is seporate, without any filament.

The filaments differ in number, from one to several hundred, in different genera, or even species of the same genus, though the latter case is rare. They, however, vary in this respect occasionally, in the same species or individual. They differ also, but very slightly, in their insertion, or origin, with respect to other parts of the flower, proceeding either from the receptacle, as in the Poppy; the calyx, as in the Rose; or the corolla, as in the Jasmine. Their form is usually simple, each filament bearing one anther; but in the Orange and St. John's Wort many filaments are united into one, and in most of the Papilionaceae family one filament only is separate, nine others being united from their base almost to the summit. In the natural order of Rutaceae, see Diosma and Eriostemon, the filaments are more elaborate in structure than usual, being tuberculated and glandular, and sometimes bearing their anthers on a sort of appendage, or pedicle. Indeed the extremity of each filament, in many instances, tapers into a fine flexible point, like an additional style, allowing of a free or rotary motion in the anther; witness the Papilion flavum and White L. Such flowers are said to have vertebrate anthers. Filaments are extremely different in proportion, some being prominent far beyond the verge of the blossom, exposing their anthers to the wind and weather, while others lie concealed in the bottom or tube of a flower, carefully protected from wet. Some are long and capillary; others short, broad, or thick.

A very curious circumstance respecting filaments is, that in some flowers they appear enfolded with a frangipanaceous motion, as in Ruta (Rut) Seksyreja and Parnassia. In these flowers the filaments bend in their turn over the stigma, that the anthers may more certainly drop their pollen upon it, and subsequently retire. In the Barberry blossom the same thing is accomplished by an epistylar iridacium in the inner side of each filament at the base, in consequence of which it contract when touched, and the pollen over the stigma, and after a while, retaining its original position, makes way for others. Some filaments are very little hygroscopic, as in the Crock's comb, Cel. f. s., contracting in dry weather, and approaching the stigma, and re-
tiring for shelter under the corolla in wet. See Recumbence of Plants.

The word *filamenta* is also used for the fronds of the genus *Coniferous*, which are; these being of a fine thread-like, or rather capillary, form and size. Roth contends that, to avoid ambiguity, *filo* should be used in the latter case, which expresses the same thing still more correctly. This is certainly an improvement, though it is scarcely possible that the ambiguity in question should cause any confusion. S.

*FILAMENT*, in Medicine, Anatomy, Natural History, &c. a term used in the same sense with fibre for those fine threads whereof flesh, nerves, skins, plants, roots, &c. are composed.

• *FILANA*, in Geography, a river of Benin, which runs into the Atlantic; lat. 4° 40'. E. long. 5° 22'.

*FILANDERS*, in Falconry, a hawk's, &c. confiding of filaments or threads of blood coagulated and dried, occasioned by a violent rupture of some vein, by which the blood extravasating hardens into the figures above-mentioned, to the great annoyance of the reins, hips, &c.

The word is French, *filandre*, formed from *fil*, thread.

Filanders are also a sort of fine small worms which greatly incommodate the hawk in the gorge, and about the heart, liver, and lungs; but which, on some occasions, are supposed to be of service, and to feed on the superfluities of certain parts. See Black Worm.

There are four kinds of these filanders or vermiculi. The first, in the gorge or throat; the second, in the belly; the third, in the reins: the fourth are called needles, on account of their exceeding fineness. The symptoms that discover the difcase are the bird's gaping frequently, straining the fret or perch with its pounces, crotching in the night, ruffling its train, rubbing its eyes, wings, nostrils, &c. As the worms are very relifsfs, the bird is frequently endeavouring to exit them up; and in opening its mouth you will readily discover them. From the throat, &c. they will ascend to the larynx, brain, &c. and finally over the whole body.

The ordinary cause is bad food. The proper remedy, they say, is not by killing them, for fear of impositions from their corruptions; but chiefly by flupifying them, that they may be offensive but feldom.

This is best effected by making the bird swallow a clove of garlic, after which it will feel nothing of the filanders for forty days. Others use rix, worm-feed, aloes, vervain, faffron, &c.

*FILANGERI*, Gaetano, in Biography, a celebrated political writer, was born at Naples on the 18th of August 1752. His parents intended him for the army, but his own genius pointed out to him the sciences as most adapted to his future pursuits. Politics, moral philosophy, and legislation engaged his mind, and seemed to absorb all his attention. He soon discovered the defects of the existing laws by which most of the European nations were governed. In 1771, he drew up the plan of a tratce on private and public education, which, however, he never completed. In 1774 he published a small work, in which he defended a new law against the arbitrary decisions of a judge, with great judgment and the noblest enthusiasm. After this he determined to retire from public life, in order that he might prepare himself for important duties, by diligent and uninterrupted study. But in 1777 he entered into the service of the court, and was appointed a gentleman of the bed-chamber, and an officer of the marine. These avocations did not prevent him from devoting many of his days, and frequently whole nights, in philosophical research. In 1788 he published the first part of his work "On Legislation," which was intended to consist of seven books, but of which only four, and a part of the fifth, made their appearance during the author's life. The early parts of this work were received with the warmest approbation; and the celebrity of the author continued to increase; but as he had indulged in liberties which were new in Italy, he was open to the attack of vocal and bigoted writers. His work was opposed by professor Joseph Grippo, who published a letter under the title of "Scienza della Legislazione Vindicata," with obervations against Filangeri's proposal respecting feudal and criminal laws. Soon after a decree was issued by which the treatise "On Legislation" was declared among the number of prohibited works, on account of the advice given in the second book, to abolish ecclesiastical property, and the proposal promulgated in the fifth for reforming abuses in the power of the church. Filangeri was, however, protected by the court, and various distinguished marks of favor were conferred upon him. In 1783 he married an Hungarian lady sent to Naples by the empress Maria Theresa, as governness to the second of the princes. With the permission of his sovereign, he retired from civil and military employment, that he might devote his whole time to the completion of his work at his country house near the town de la Cava, a few miles from Naples, where he resided till March 1787, when he was appointed to a place in the royal college of finance. In this situation he appeared with great advantage as a statesman, and many wise and useful establishments were formed in consequence of hints which he suggested. Scarcely had he arranged his plans of economy and reform, when he was arrested by the hand of death. He died in July 1787, in the 37th year of his age. His death was lamented by the monarch, who settled a pension on his infant family, to be employed in their education. The demand for his great work on legislation was so great, that it went rapidly through ten editions in his own country, and was translated into the German and French languages. Gen. Bug.

*FILARIO*, in Zoology, a genus of intestinal worms, which have the body round, filiform, equal, and quite smooth; the mouth dilated, and furnished with a roundish concave lip.

The genus filaria, as now established, unites some few of the Vermes, formerly referred to the genus Afacris, and according to its more extensive application in the Gmelinian edition, some of the Gordius tribe may be included also in the same genus. The vermes, which are truly of the filaria genus, seem to be abundant throughout the animated nature; they are not found in man, nor has their presence been hitherto determined in the higher class of domestic animals, the horse excepted; but there are few of the unmedicated quadrupeds, and scarcely any of the bird tribe that have been attentively examined, in which they have not been discovered; they are observed in the fish and reptile race, and infects are infected with them in incalculable numbers. As these are the most simple of intestinal worms, the different species may not perhaps have hitherto been discriminated with sufficient accuracy; they do not seem to afford any very decisive characters by which the species may be readily distinguished; and it is no doubt for this reason that systematic writers describe and class them merely according to the respective animals in which they are observed. Gmelin infers that highly dangerous creature, the hairworm of the Indies, at the head of this genus, because it infests man: in this influence he deviates from the example of Linnaeus, who considered that kind of vermes as a species of gordius, and not without reason. The two genera,
genera, filaria and gordius, are indeed analogous, and correspond in every essential particular, except the structure of the mouth, and the difference in this respect is not expressed with due precision either by Linnaeus or Gmelin; the filaria genus have the mouth terminal, and more or less perceptibly dilated, of a simple form, and furnished with a rounded tip; to the Gmelinian character of the gordius we should add that the mouth confits only of a dent or incision, and is so very minute as to be imperceptible to the naked eye.

Species.

* Infilging the Mammalia.*


Found in the cellular membrane of horses. Linn. In the hoof. Redi.

Martes. In the Martin. Redi.

Lepores. In the cellular membrane of hares. Pallas.

** Infilging Birds.**

Falconis. In the cellular membrane about the abdomen and thighs of hawks. Redi.

Syriavis. In the cellular membrane about the head and ears of owls. Pallas.

Corvocis. In the crop and lungs of crows. Pallas.

Ciconis. In the cellular membrane of the foot. Redi.

Gallinae. In the smaller integuments of poultry. Goeze.

The body is capillary, and about two inches long.

*** Infilging Insects in their perfect State.***

Scarabaei. In the scarabaeus funerarius. Phil. Trans.

Sphynx. In the sphinx obscura. Goeze.

Calipri. In the carabus. Litter.

Grylli. In the Gryllus. Redi.

Monoculi. In the monocus apus.Walch.

*** Infilging the Larvae of Insects.***

Lepidopterorum. Tail hooked. Schrank.

Papilionum. In butterflies. Werner.


Sphynx. In the sphinx euphorbe. Roefel.

Phalanx. In the phalana. Mannigf.


These creatures are found under the skin of the larva, sometimes solitary, from four to seven inches long, and very destructive.

Tenthredinis. Found in the larvae of the tenthredo. A.D. Stokck.

Phyryganei. Found in the larvae of the phyryganei. Dogger.

FILAWS, among the modern Egyptians, villages inhabited by the original natives of the country.

FILAZER, FILAZER, FILAZER, an officer in the court of common pleas, so called because he files the writs whereon he makes out process.

Of these there are nine in the several divisions and counties.

of England. They make out all writs and processes upon original writs, issuing out of chancery, as well real as personal and mixed, returnable in that court. In actions merely personal, where the defendants are returned summons, they make out purs or attachments, which being returned and executed, if the defendant appears not, they make out a dehiman, and so ad infinitum, or till he does appear.

If he be returned nisi, then proceed of capias infinite, if the plaintiff will, or after the third capias the plaintiff may proceed to outlawry in the county where his original is grounded, and may have an exigent with proclamation.

The filazer like wise make out all writs of view in real actions where the view is prayed; and upon pleas and records, writs of retorno hankendo, second deliverance, and writ of withersam. In real actions they make out writs of grand and petit cape before appearance.

They enter all appearances and special bail upon any process made by them. They make the first fier facias upon special writs, of habeas corpus, disfrazas, non recusation vel hallucum, and due stecans; and all superedefus, upon special bail or appearance, &c. writs of habeas corpus cum causa upon the sheriffs return that the defendant is detained with other actions, and writs of adjournment of a term, in case of pestilence, war, or public disturbance.

Tell an order of court made 14 Jac. I. which limited the filazers to all matters and proceedings before appearance, and the prothonotaries to all after, they also entered declara- tions, impariances, judgments, and pleas, whereto a serjeants hand was not requisite, and made out writs of execution, and divers other judicial writs after appearance. The filazers of the common pleas have been officers of that court before the flat. 16 Hen. VI. c. 4. in which they are mentioned; and in the kings bench, of later times, there have been filazers who made out processes upon original writs returnable in that court on actions in general.

FILBERT, a common name frequently applied to the bell fruit of the hazel nut. It is often written filberd, and sometimes filbard.

FILBERT, the name of the tree from which the filbert nut is obtained. It is the low, thrubby tree usually planted out in gardens, orchards, and other places. See Corby.

These trees may be raised by planting the nuts, by layers, by suckers from the roots, and by grafting upon hazel stocks; but the best methods are those of layering, and planting the off-frets or suckers. The layers should be laid down in the early autumnal season, and when they are become fully rooted, be taken off, and planted out in rows at the distance of two feet and twelve inches apart, in the rows. After they have attained sufficient growth in their rows, they may be carefully taken up and planted where they are to remain.

The off-frets or suckers may be taken off with good radical fibers, and be immediately planted out where they are to remain.

They answer well where the soil is of the light, meallow, fertile kind, but will succeed in most, when well protected from cold winds.

They may be planted in the standard method, in rows, at ten, fifteen, or twenty feet distance, by twelve feet in the lines; or be trained to single stems, to the height of four, five, or six feet, with full branches, spreading leads, and in the hedge manner, either in single or double rows, ten or twelve feet between; but the standard mode is most probably the best, as producing the finest nuts.

In Kent they never suffer these trees to rise higher than
FILE.

fix feet, regularly proung them in the manner of the gooseberry bush.

There are two sub-varieties of this tree, namely, the white-skinned, and the red-skinned, the former being in general the moat esteemed.

Filberts, Petrifed, in Natural History, and filbert-trees also, have been described by different authors, as found in the strata of the earth. Mr. John Ray mentions such as being found under the city of Modena and its neighbourhood, at twenty-six feet beneath its surface; but Mr. Whitehurst, who quotes this passage at length, in his Enquiry concerning the Earth (till ed. p. 172.) observes, that these are not original strata, but modern accumulations of alluvial soil, which have buried the beans, corn, filberts, &c. in the alterations which the superficial parts of the ground about Modena have undergone; and similar remarks might, we believe, be applied to every other instance of real filbert-trees or nuts being found beneath the surface of the earth, or in accumulations of calcareous tufa, (see Nuts;) and the same will be found to belong to the class of recent fossils, mentioned in our article Coal.

FILE, an instrument used for reducing, and for giving shape and smoothness to a number of articles made of wood or metal.

It is divided into two varieties from the form of their teeth, namely, files and rasps. The former are cut upon the surface with a shap-edged chisel. In the latter, the tooth is railed with a triangular punch. The file is adapted for working metals, but the rasp is more fitted for wood, bone and horn.

Files again are distinguished by being single or double cut. The single cut file is simply cut once over, and is employed for filing brads, and the softer metals. A second course of teeth is cut to form the double cut file, crossing the grit diagonally. This kind is best suited to iron and steel.

Files are also called by different names, from the various degrees of keenness of their teeth, as smooth, second cut, ballard cut, and rough files.

And again, from their shape, they are called flat, half-round, square, three square, round, and some having two round sides.

The file employed for files requires to be very hard, and in consequence undergoes a longer process in the conversion: it is said to be double converted.

The very heavy files, such as smiths' rubbers, are made of the inferior marks of blistered steel: the more delicate kind, such as watch-makers' files, are made of cast steel. The file is previously drawn at the till, into rods of suitable size.

Forging of Files.—The flat and the square files are made wholly with the hammer, and the plain anvil. Two workmen, one called the maker, and the other the chaser, are required in the forging of heavy files; the smaller being forged by one person only.

The anvil is provided with a gate, or groove, for the reception of certain boisters, or dies, which are used for the purpose of forging the half-round and three-angled files. The half-round boists contain a hollow which is the segment of a sphere, much less than half a circle. That used for the triangular files has a large or hollow, consisting of two files, terminating in an angle at the bottom.

In forging the half-round file, the file is first drawn out, as if intended to make a flat file. It is then laid in the boists and hammered, till the under side becomes round. The file for the triangular file is tilted into square rods. The part to form the file is first drawn out with the hammer, as if intended to form a square file. It is then placed in the boists with one of the angles downwards, and by striking upon the opposite angle, two sides of the figure are formed into one, and consequently a three-sided figure produced. By successively presenting the different sides to the action of the hammer, the figure is rendered still more complete.

In forming the tangs of most files, it is necessary to make the shoulders perfectly square and sharp. This is performed by cutting into the file a little on each side with a sharp file or aggeron, and afterwards drawing out the part so marked off, to form the tang.

After forging, and previous to being ground and cut, the files require to be annealed. This process is generally performed by piling up a great quantity together, in a furnace for the purpose, and heating them red hot; suffering them afterwards to cool slowly. This method of annealing files, or indeed any other articles, in which great hardness is requisite, is very objectionable, since the surface of steel, when heated red hot in the open air, is too liable to oxydation. Too evils result from this circumstance, besides the loss by waste. First, the fey oxyd is very hard, and difficult to remove; and secondly the file, particularly on the surface, is deprived of a portion of its carbon, and thereby rendered less susceptible of hardening.

A superior method of annealing is practiced by some file makers, and since hardnefs in a file is so essential a property, the process ought to be generally adopted.

This method consists in placing the files in an oven or trough, having a close cover, and filling up the interfaces with sand. The fire is made to play on every side of this vessel, as gradually, and as uniformly as possible, till the whole mass becomes heated red hot. The fire is then discontinued, and the whole suffered to cool, before the cover is removed from the trough. Another evil may however arise from keeping steel red hot even in a close vessel, for too great a length of time. It assumes a kind of crystallization under which its tenacity is much impaired. Hence, it will be proper not to anneal too many at once, and not to heat them too hot. Steel, annealed in this way, is perfectly free from that fey surface acquired in the open air; and if each corticle be perfectly surrounded with the sand, and the cover not removed before the file is cold, the surface will appear of a fey white colour.

If the file be suspected to be too kind, from containing too little carbon, powdered charcoal may be employed instead of sand, or sand mixed with charcoal. In this case the files should be stratified alternately with the charcoal, in order that the extra-conversion may be uniform.

The next thing is to prepare the files for cutting, by making the surface, to contain the teeth, as level as possible. This was formerly effected by means of files; and the process is called tripping. The fame is still practiced by the Lancashire file makers, and by others not having convenience for grinding. The greatest quantity of files, however, are ground to prepare them for cutting. The stone employed for the purpose is of the sandstone kind, the texture of which is compact and sharp, but rather rough. They are of as great diameter as can be used with convenience; and about eight inches broad over the face. When used, the surface is kept immered in water. The grinder fits in such a position as to lean over the stone, while its motion is directly from him. Its surface moves at about the same speed with those used in grinding cuttery. Since the object in grinding files is to make the surface as even and flat as possible, and as this cannot be done to completely upon a small stone, the stones of the file-grinder are laid aside when they are reduced to a certain size, and are employed for grinding.
F I L E.

grinding other articles. Though grinding is by far the most expeditious method, it does not give that truth to the surface which can be effected by filing. If the price of the articles would admit, however, it would be well to render the surface more even by the file after grinding. If the surface be not flat, it is obvious, that when the file is used for filing a large surface, those teeth in the hollow parts of the file will not be brought into action. It is from attention to this circumstance, and to the care in annealing and hardening, that the Lancashire file-makers have generally excelled. They have, however, confined chiefly to the small articles, since the larger files would not pay for the process of filing.

Cutting of Files.—If the vast number of teeth contained in a file, and their requisite uniformity are considered, a machine capable of effecting a purpose so apparently mechanical, may be considered a deodatam.

Though many attempts have been made to accomplish this object by machinery, and several varieties of machines have been constructed for the purpose, no one has yet been sufficiently general in its application, to render the projection of such an object very desirable. Among those who have distinguished themselves in this enquiry, Mr. Nichollson, the publisher of the Philosophical Journal, we believe, invented the most likely machine for file cutting, for which he took out a patent. We do not know, however, that either Mr. Nichollson’s, or any other machine, is at present used for the purpose. A file, which is of the same breadth and thickness throughout, of any form, may be cut by the machine, because the same magnitude of strokes is required for every tooth; but if the file be conical, it is obvious that a machine capable of giving all the varieties of strokes required in cutting even one side of a file, would be too complicated to be of any great utility. Again, the chisel employed for cutting a file is frequently liable to snap, or be otherwise out of order. This the workman, in the common way of cutting, can easily feel, and immediately stops to repair it. A very great evil would arise from this source, in cutting with the machine; and this evil would be greater in proportion to the number of chisels which one person had to overlook. It has also been said, but we cannot affirm the fact, that the teeth raised by machinery are not so full and sharp as those formed by hand. Till the above inconveniences can be obviated, in all probability the common method will be continued; the different apparatus and mode of performance of which we will endeavour to describe.

The tools of the file-cutter consist of an anvil placed upon a block of such a height, that the man fits to his work. He has also a piece of lead, or lead clayed with tin, on which he lays the file when one side is cut. The chisel and hammer are of such size, as the file and cut of the file require. He is also provided with a leather strap, which goes over each end of the file, and passes round his feet, which are introduced into the strap on each side, in the same manner as the fitters are used. The file-cutter, therefore, fits as if he were on horseback, holding his chisel with one hand, his hammer in the other, at the same time he secures the file in its place by the pressure of his feet in the fitters. A, fig. 1. (Plate XII. Nifeehany.) is the block; B, the anvil; a b, the file, laid upon the piece of lead; C, C, the fitters passing over the ends of the file; D, the feet on which the workman fits. Fig. 2. is the form of one of the chisels for cutting the files. Fig. 3 represents the chisel or punch for raising the teeth of the file. Fig. 4. the hammer used to strike the head of the chisel. These people have found by experience that there is an advantage in having the head of the hammer hooked inwards. This is easily accounted for, when we observe that the stroke will be made pretty near the centre of percussion. Great pains ought to be taken in preparing the edge of the chisel. It is, in the first place, hardened and tempered by heating it gradually till it appears of a yellowish brown. It is next ground very true to form the edge, which is afterwards washed upon a Turkey stone, with oil. It is not required to be very sharp, the bottom of the tooth requiring to be rather open, to prevent the file from clogging with the substance to be filed. The edge is also required to be very smooth, in order that it may slip easily upon the surface of the file; this is also facilitated by slightly greasing the surface. From this advantage, the worker, after making his cut file, is enabled, by feeling only to form, at its proper distance, the cutting tooth, by filing the chisel close up against the back of the preceding one. All these motions are performed with astonishing rapidity, first the chisel and then the hammer. We observed a boy, in cutting three-sided files of five inches long, bastard cut, make 225 strokes, which produced as many teeth, in one minute. And the whole file being double-cut, contained 1350 teeth, or six times the above quantity. The second cut file, of the same size, contains 2025 teeth, and the smooth file 2500, consequently, the difference in labour between the bastard-cut and the smooth files is about as two to one. Larger files, from the greater surface, require a much greater stroke to raise the tooth, and consequently fewer strokes will be made in the same time.

In the double-cut files, the first set of teeth, which the workmen call up-cuttings, are, previously to cutting the second course, filed lightly upon the face, in order to allow the chisel to slide freely.

The single-cut file is more durable than the double-cut, and ought to be preferred for all purposes, excepting for iron and steel.

The same method is employed in cutting the rasp. The workman is however guided completely by his eye, in regulating the distance of the teeth from each other. The rasp ought to be cut in such a manner that no one of the teeth may stand opposite to another. This not only allows the rasp to cut faster, but makes the surface, either of wood or other substance, much smoother.

Hardening of Files.—This is the last and most important part of file making. Whatever may be the quality of the steel, or however excellent the workmanship, if it is not well hardened, all the labour is lost.

Three things are strictly to be observed in hardening:—first, to prepare the file on the surface, so as to prevent it from being oxydized by the atmosphere, when the file is red hot, which effect would not only take off the sharpness of the tooth, but render the whole surface too rough, that the file would, in a little time, become clogged with the substance it had to work. Secondly, the heat ought to be very uniformly red throughout, and the water in which it is quenched fresh and cold, for the purpose of giving it the proper degree of hardness. Lastly, the manner of immersion is of great importance, to prevent the files from warping, which in long thin files is very difficult.

The first object is accomplished by laying a substance upon the surface, which, when it fuses, forms as it were a varnish upon the surface, defending the metal from the action of the oxygen of the air. Formerly, the process consisted in first coating the surface of the file with salts, and then covering it over with pulverized common salt, (muriat of soda.) After this coating became dry, the files are heated red hot, and hardened; after this, the surface is lightly brushed over with the dust of cokes, when it appears white and metallic, as if it had not been heated. This process has lately
lately been improved, at least so far as relates to the economy of the salt, which, from the quantity used, and the increase of duty, had become a serious object. Those who use the improved method are now consuming about one-fourth the quantity of salt used in the old method. The process consists in dissolving the salt in water to saturation, which is about three pounds to the gallon, and stiffening it with ale grounds, or with the cheapest kind of flour, such as that of beans, to about the confidence of thick cream. The files only require to be dipped into this filtrance, and immediately heated and hardened. The grounds, or the flour, are of no other use, than to give the same confidence, and to that means, allowing a larger quantity of salt to be laid upon the surface. In this method, the file forms immediately a firm coating. As soon as the water is evaporated, the whole of it becomes fixed upon the file. In the old method the dry salt was so loosely attached to the file, that the greatest part of it was rubbed off into the fire, and was sublimed up the chimney, without producing any effect.

The carbonaceous matter of the ale-grounds is supposed to have some effect, in giving hardnes to the file, by combining with the flour, and rendering it more highly carbonated. It will be found, however, upon experiment, that vegetable carbon does not combine with iron, with sufficient facility, to produce any effect, in the short space of time a file is heating, for the purpose of hardening. Some file makers are in the habit of using the coal of burnt leather, which doubles produce some effect; but the carbon is generally found prepared for the purpose, and the time of its operation so short, as to render the effect very little. Animal carbon, when properly prepared and mixed, with the above hardening composition, is capable of giving hardnes to the surface even of an iron file.

The carbonaceous matter may be readily obtained from any of the soft parts of animals, or from blood. For this purpose, however, the refuse of shoe-makers and curriers, is the most convenient. After the volatile parts have been distilled over, from an iron fill, a bright shining coal is left behind, which, when reduced to powder, is fit to mix with the salt. Let about equal parts, by bulk, of this powder, and muricit of soda, be mixed together, and brought to the confidence of cream, by the addition of water. Or mix the powdered carbon with a saturated solution of the salt, till it become of the above confidence. Files which are intended to be very hard, should be covered with this composition, previous to hardening. All files intended to file iron or steel, particularly few files, should be hardened with this composition in preference to that with the flour or grounds. Indeed, we are of opinion, that the carbonaceous powder might be used, altogether, in point of economy, since the ammonia or harthorn, obtained by distillation, would be of much value and remainder the coal of no expense. By means of this method the files made of iron, which in itself is infusceptible of hardening, acquires a super usable hardness, sufficient for any file whatever. Such files may at the same time be heated into any form, and, in consequence, are particularly useful for sculptors and die filers.

The next point to be considered is the best method of heating the file for hardening. For this purpose a fire, similar to the common smiths’ fire, is generally employed. The fire is held in a pair of tongs, by the tongs, and introduced into the fire, confining of very small coals; pulling it more or less into the fire for the purpose of heating it regularly. It must frequently be withdrawn for the purpose of observing, that it is not too hot in any part. When it is uniformly heated, from the tang to the point, of a cherry red colour, it is fit to quench in the water. At present an oven, formed of fire bricks, is used for the larger files, into which the blast of the bellows is directed, being open at one end, for the purpose of introducing the files and the fuel. Near to the top of the oven are placed two crofs bars, on which a few files are placed, to be partially heated. In the hardening of heavy files, this contrivance affords a considerable saving, in point of time, in addition to which they are more uniformly and thoroughly heated.

After the file is properly heated for the purpose of hardening, in order to produce the greatest possible hardnes, it should be cooled as soon as possible. The most common method of effecting this is by quenching it in the coldest water. Some file makers have been in the habit of putting different filiances in their water, with a view to increase its hardening property. The addition of the sulphuric acid to the water was long held a great secret in the hardening of saw files. After all, however, it will be found, that clear spring water, free from animal and vegetable matter, and as cold as possible, is the best calculated for hardening files of every description.

In quenching the files in water some caution must be observed. All files, except the half round, should be immerged, perpendicularly, as slowly as possible, so that the upper part shall not cool. This management prevents the file from warping. The half round file must be quenched in the same steady manner, but at the same time it is kept perpendicularly to the surface of the water, it must be moved a little horizontally, in the direction of the round file, otherwise it will become crooked backwards.

When the files are hardened, they are brushed over with water and powdered cakes, when the surface becomes perfectly clean and metallic. They ought, also, to be washed well, in two or three clean waters, for the purpose of carrying off all the salt, which, if remaining, will be liable to ruin the file. In addition to this, they should be dipped into line water, and rapidly dried before the fire, after being oiled, with olive oil, containing a little oil of turpentine, while still warm, and they are deemed finished.

File is also a thread of wire wherein writers or other exhibits in courts or offices are fastened or filed, for the more safe keeping and ready turning to the fame.

A file is a record of the count, and the filing of the proceedings of a court makes it a record of it. 1 Lil. 112.

File, or Label, in heraldry, a bearing, sometimes of more, and sometimes of fewer points, being the difference or distinction of the eldest son.

It is sometimes also borne as a charge in a coat armour, of which Gwilliam gives many instances; but it is oftener the difference or mark of distinction which the elder brother bears in his coat during his father’s life.

Some distinguish file and label, calling the file the upper horizontal line, and the label the points which issue from it.

File of three, or more labels. See Label.

File, in a Military Service, is a row of men standing one behind another, as a rank, on the other hand, includes any number drawn up before each other: whether, in either respect, they be in close or open order.

Or file is a line or series of soldiers, placed one before another, and thus composing the depth of a battalion; and it is thus distinguished from the rank, which is a line of soldiers, drawn up file by file, forming the length of the battalion. A file is two or three deep; hence, a battalion or regiment drawn up consists of two or three ranks, and of as many files as there are men in a rank. Files of cavalry
are generally two deep. A file on horse-back occupies in the ranks about two feet eight inches; a file on foot occupies in the ranks twenty-two inches.

Close files in cavalry are at the distance which was taken before dismounting, when each man's boot-top touches, without pressing, that of his neighbour.

Open files, in cavalry movements, are six inches distant from boot-top to boot-top, being calculated for the gallop as well as the walk of a squadron.

In the covering of files on horse-back, the same directions hold good as on foot. Besides, it must be familiarly observed, that every man's horse stands exactly straight to the same front as that of the man before him. Both in the horse and foot drill the men should be often practiced in covering. The former are thus taught to place their horses straight under them.

Close files of infantry are soldiers standing in rank, contiguous to one another, upon any given depth of line or column. Whenever a regiment marches in front, every man should feel his next man in whatever way he drestes; but he must not lean upon him, nor must he move his arms from his body to feel him: so that arm close files mean merely that soldiers in the ranks should lightly touch each other, without crowding or pressing. Open files are soldiers standing in rank at given distances without touching one another.

The formation at open files is only practised as a preparatory drill for forming at close files (which is the order for action). In order that every man may be taught to stand and move in a proper position, without getting a habit of leaning upon his neighbour. On this account, every intelligent officer who has the management of recruits, will form them sometimes at open files, and march in that order. Soldiers that have been regularly drilled should likewise be occasionally practiced in advancing by open files. Double files are formed by the left files in each rank stepping to the rear of the right files. Indian files denote a line of men advancing or retreating from either of the flanks, from the centre, or from any proportion of a line in succession to one another. They are sometimes called "goose-files," a term vulgarly used among soldiers, and derived from a lack of grace, which generally follow a leader one by one. We say, close the files; that is, bring the men nearer each other. Double the files; that is, double the depth of the battalion, and diminish its breadth or front by one half. The halt or hindermost person is laid to bring up the files. To file, that is, to advance, or from any given point by files; as to file to the front, to file to the rear, to file from the right or left flank, or to file from any given company. To file off, is to wheel from marching in a parallel front, and to march in length by files. See Drill.

File-leader is the soldier placed in the front of any file, or the man who is to cover all those that stand directly in the rear of him, and by whom they are to be guided in all their movements. File-leaders should be very careful to preserve their proper distances, from which ever hand they are to drest to, and the followers of each file must only be careful to cover, and be regulated by their proper file-leaders. In file the rear rank invariably drestes by, and is regulated by the front rank.

File marching on foot. According to the printed regulations, all recruits must first face, and then be instructed to cover each other exactly in file, so that the head of the man immediately before may conceal the heads of all the others in front. The men should move with the lock-step. The front-rank men should cover exactly, and the rear-rank men keep close and drested to the front rank. File-marching may be performed to the front, to the rear, and to either flank; in all which cases the men must be taught to cover well. When recruits are at drill, on the word march, all are to step off together, gaining at the first step thirty inches, and so continuing each step, without increasing the distance between each recruit, every man looking or placing his advanced foot on the ground, before the spot whence the man who preceded him had taken up his. Marching by ranks in front, open files, is when any body of men advance by ranks at close order, and drest to some given object without touching one another. The file-man of the flank to whom the soldiers drest, must be a non-commissioned officer, and he must take care that his heel be kept quite straight to the front, and his body erect, and that he advances without deviating in any the least degree to the right or left. In order to execute this essential part of the drill accurately, two perons should be present, one in the front, and the other on the flank, to observe the dreasong. Marching by ranks in front, close files, is when any number of men advance by ranks at close order, and drest to some given object, each man lightly touching his next man, without crowding or pressing. The march in front at close files is much more easy than that at open files, because every man feels his next man, which ever way the rank drestes, and into whatever direction the rank or column moves.

FILEFIO, FRANCIS, in Biography, a distinguished Italian writer, was born at Tolentino in the year 1398. He studied at Padua with so much success, that he was invited to open a school of eloquence at Venice in his 20th year. In 1410 he went to Athens, where, under the direction of John Chrysostom, for Manuel, he applied himself so vigorously to the study of the Greek language, as to be sent ambassador to Sultan Amurath I., in whose service the emperor Sigismund. In this latter embassy he received an invitation from Ladislaus IV. King of Poland, to assist at his martials, and on that occasion he recited an epiation at Cracow, in the presence of the emperor and princes. Returning to Constantinople, he occupied himself in literary concerns, and in 1427 he revisited Venice on the express invitation of many of the nobles. From Venice he removed, in 1428, to Bologna, where he was received with extraordinary honours, and appointed professer of eloquence and moral philosophy, with an ample stipend. Civil affairs obliged him in a few months to quit Bologna, and from thence he went to Florence, where he soon collected four hundred scholars, and was admitted to the rank of citizen by a public decree. Here his life was sometimes in danger from his enemies, among whom he reckoned the chief to be Cosimo de Medici. In 1433 he accepted of a professorship at Sienna, where he was attacked by the same affiai from whole malice he had formerly escaped at Florence. The villain was detected, and punished with the loss of a hand. The reputation of Tilefio was now so high, that he was invited,
invited, at the same time, to the performance of important duties by the pope, the Greek emperor, the duke of Milan, and the universities of Perugia and Bologna. He accepted the latter, where he re-opened his school for a few months only, when, repairing to the court of the duke of Milan, he was retained by him in his service, and treated with great favour. The death of the duke, in 1447, deprived him of a powerful patron, but he was, after a considerable interval, received by the successor to the dukedom, Francis Sforza, who assigned him an honourable stipend. He next went to Rome, where he experienced the liberality of pope Nicholas V. Proceeding to Capua, he was treated with extraordinary regard by Alphonso king of Naples, who conferred upon him the honour of knighthood, allowed him the privilege of using the royal arms, and placed on his head the poetical crown of laurel. Upon his return to Milan, he learnt that his mother-in-law, the widow of Chryfoloras, and her two daughters, were made slaves in the capture of Constantinople by the Turks; at the earnest request of Filelfo the duke dispatched two messengers to Constantinople, with a letter and an ode addressed to Mshonett II., who restored the female captives without a ransom. At the same period Filelfo became reconciled to Cofno de Medici, and ever after remained in friendship with that illustrious family. On the election of pope Pius II. in 1458, he settled a pension on Filelfo, which being paid only one year, gave him an occasion to decline against the court of Rome and the pontiff, a liberty which was punished with imprisonment. In 1469 he presented pope Paul II. with his translation of the Cyropædia, for which he received a present of four hundred ducats. This donation was handson, and perhaps unexpected, and he felt it his duty to go to Rome and return thanks in person. In the course of his journey he was honourably received and treated at Florence, by Peter and Lorenzo de Medici. He continued to reside at Milan till 1474, when he obtained leave, on the invitation of pope Sixtus IV., to become professor of moral philosophy at Rome. After this he removed three times to Milan, and back again to Rome, till at length, in the eighty-third year of his age, he accepted an invitation from Lorenzo de Medici to a Greek professorship at Florence. In the performance of the duties of this office he died, in 1481, a very short time after his arrival. He left behind many books, which consist of orations, moral discourses, poems, and familiar epistles, that afford much curious anecdote relative to the times. As a man of letters, he is more to be admired for his industry, and the great compass of his attainments, than for peculiar excellence in any one branch. Nevertheless he was a good historian, well skilled in classical learning, and a profound grammarian. Morei.

Filer un son, Fr. in Musæ, implies the conduct of the voice in singing, in such a manner as to be able to prolong, swell, or run rapid divisions of many bars, without taking breath. The French verb fîler, literally means to string, thread, or wire-draw any substance; and, applied to the voice, it means almost every perfection of a great finger. Millicu used to say that the voice, by practice, should be rendered as dulcet as wax when worked by the hand till it will receive any impression. Roucoub says there are two ways of managing the voice which come under the term fîler les fons: the first is what we have been describing; the second, that of sustaining a tone steadily, and perfectly in tune, in a long note, while the accompaniments are busily employed. When the Gabrielli was here, during the time that the Aguiari sung at the Pantheon, after she had finished one of her bravura airs, with long and difficult divisions, and such high notes as had never been heard in England before, the Gabrielli said to a gentleman in our hearing "mais messieurs, ce n'est pas filer les fons;" one finger is never to prate another. Aguiari was however a very great finger in a different style from that of the Gabrielli; who, when at her best, had very singular vocal abilities. We have just now recollected that Aguiari was forgotten in the alphabetical order where she ought to have had a niche, for which we beg pardon of her name, and shall try to deserve it, by doing her justice here.

Lucretia Aguiari was a truly wonderful vocal performer. The lower part of her voice was full, round, of an excellent quality, and its compass, after she quitted its natural register, which it was to be wished she had never done, beyond any one else had then heard. She had two octaves of fair natural voice, from A on the fifth line in the base, to A on the fifth line in the treble, and beyond that, in alt, she had in early youth more than another octave; as Sacchini told me (Sayburn) he had heard her go up to B B in altissimo. Her voice was open and perfect, her intonation true, her execution marked and rapid, and her style of singing, in the natural compass of her voice, grand and majestic; though the pathetic and tender were not what her manner or figure promised, yet she had expressions sometimes that were truly touching, and she would have been as capable of exciting universal pleasure, as admiration, if she had been a little less violent in the delivery of her passages, and her looks had been more tempered by female softness and timidity. She sang hardly any other music while she was here but her husband's, Signor Colla, which, though often good, was not of that original and varied cast which could supply the place of every other master, ancient and modern.

At this time there was no male singer in England with irresistible attractions; Rauzzini indeed was here, who more frequently pleased than surprized his audience; but it was during this period that the proprietors of the Pantheon ventured to engage the Aguiari at the enormous salary of 100L. a night, for singing two songs only! And yet, however exorbitant the demand, or imprudent the compliance with it may seem, the managers of this most elegant and superb building, which would have done honour to Greece as a performance splendid period of taste and magnificence, have, since that period, by going a more economical way to work, involved the proprietors in disgrace and ruin. Indeed in subsequent undertakings, previous to the fatal destruction of the building by fire, they have more frequently had money to pay than receive; for, notwithstanding so much was disbursed to the Aguiari, much was likewise cleared, and the dividend was more considerable than it has ever been since that memorable era. The admirable Aguiari, as Sacchini told us, was in her youth called "la Baffardella;" and being lame it was said, that, as soon as born, she had been abandoned on a dunghill by an unnatural mother, where a pig was beginning to devour her, when she was unexpectedly discovered, and humanely protected, adopted, and so well educated in music, as to become the wonder of her age and country. This admirable singer died at Parma in 1783.

FILEY, in Geography, a small fishing town of England, on the E. coast of the county of York, in a bay on the German sea, to which it gives name; near it is a ledge of rocks, called "FILEY BRIGG." In 1801 the inhabitants were 605.

FILIAL, something belonging to the relation of a son, filius.

The divines usually distinguish between a fervile and a filial fear. The most abandoned have a fervile fear of God, such...
such as that of a slave to his master; but not a filial fear, i. e. a fear resulting from love and respect.

**FILIAL**. See **CUSTOM of London**.

**FILICAIA, VINCENZO DA**, in Biography, an elegant Italian poet, was born at Florence in 1642. He studied and took his degrees at the university of Pisa. He married at the age of thirty-one: he was fond of retirement, occupying himself in poetical composition, and in the duties of domestic life. He was first brought to public notice by his fine canzonet composed on the raising of the siege of Vienna. For this he received the most flattering and complimentary letters from several crowned heads; from the emperor Leopold, the king of Poland, the duke of Lorraine, and the queen of Sweden. By the latter he was adopted into her own academy, and she took upon herself the charge of maintaining his children; at the same time commanding him to conceal her bounty, as being inadequate to the merits of so great a man. He was created a senator by the grand duke, and employed in some important duties by that prince, which he performed with so much credit, as to gain the esteem of the prince, and affection of the people. He died universally lamented, at Florence, in the year 1707, at the age of sixty-five. "He was," says his biographer, "one of the principal ornaments of modern Italian poetry, displaying, as well in his canzonet as his sonnets, great splendour, animation and dignity, and scarcely surpassed by any in vigour of sentiment and energy of style. He also wrote Latin verse with elegance, and some of his orations and epistles are inserted in the "Profe Fiorentine," He was member of the academies of La Crusca, and the Arcadi. His son Scipio gave a compleat edition of his Italian poems, under the title of "Prose Tofane di Vincenzo da Filicata, Senator Fiorentino," 1707, 4to." Moreri.

**FILICES, in Botany.** Ferns, a very distinct and natural order of the class Cryptogamia of Linnaeus. The name is supposed to be derived from flum, a thread, in allusion to the slender segments, or rather stalks, of these plants, whence also they are termed capillary plants, and some of them have the name of Maidenhair. They constitute the fifth natural order in the first class of the Physiella of Jussieu, and the first order of the twenty-fourth class of the Linnaean artificial system.

Their herbage is a frond, or leaf bearing frutification, rarely arborecent, involute when young, the flake more or less fealty; the root perennial, and generally very long-lived. Frutification most commonly on the back of the leaf; sometimes at the edge; sometimes, (by a transformation, as it were, of a leaf or its lobes,) spikied and terminal, or foliar and axillary. Capules usually of two valves and one cell, mostly flat, and bound with a contrary elastic ring; sometimes fidele and aggregate; very rare of many cells. Seeds extremely minute and copious.

The flowers of ferns are as yet altogether unknown, except what Hedwig has described in *Equitum;* see that article. The same admirable investigator thought he discovered anthers differed about the rib of the leaf in some common ferns, and piliills under the cover of their young fruit, see his *Thoria Generationis et Frutificationis Plantarum Cryptogamicarum, 43; 5. 6. 7;* but others have not adhered to this theory. Bernhardi has suggested another, equally hypothetical, that impregnation is performed on the upper side of the leaf, the pollen being secreted by small membranous anthers situated near the margin, and the stigmas placed directly over the point of attachment of each dot or mass of capules. See Sims and Konig's *Annals of Botany,* v. 1. 107; but this is not better supported by facts than the doctrine of Hedwig. Some have imagined the ring which embraces the capsule in most dorousferous ferns, might perform the office of an anther; but such a theory will not account for the impregnation in genera where no such part is to be found.

The seeds of ferns, independent of poetic fancies, were early known to naturalists. Giseke points out a passage in Cordus, denying them seeds indeed, but afferring that all ferns are propagated by the dust at the back of their leaves. Morison tells us he raised from seed the Harts-tongue and the Osmund-royal; see his *Historia, v. 3. 555 and 593.* Microscopic observers, about the same time, readily ascertained the structure of the capsules, and appearance of the seeds. Ehrlath observed the germination of *Asplenum spinulatum;* and Mr. Lindsay of Jamaica raised many ferns of that island from seed, as recorded in the *Transactions of the Linn. Soc.* v. 2. 93, carefully attending to, and delineating the progress of their growth. Mr. Fox of Norwich first raised a *Lycopodium* from seed; see *Tr. of L. Soc.* v. 3. 314. Similar experiments have been repeated by various other persons, and in hot-houses, where the larger kinds of *feres* are cultivated, young seedlings, of a feasty pellicul appearance, like an *Asphondylia.* Many often be seen scattered over the moist earth, or round their bark. Some seeds, in the hands of collectors, in his letters on Cryptogamous plants, translated by Mr. Konig, and published at London in 1807, that the cotyledons of these plants are not always simple, and this raises another difficulty respecting a natural classification by those parts. See *Cotyledones* and *Dicotyledones.*

The possible increase of ferns, if we consider the abundance of their seeds, is beyond computation. A single leaf will often bear one hundred millions of seeds. Yet we have no reason to think the countless numbers, that turn to no account as to propagating the species, afford food for animals of any kind, or serve any other secondary purpose.

Besides the feminal mode of increase, a few ferns produce gemmae, or buds, on their fronds or leaves, as *Woodwardia radicans;* and some take root at their points, as *Asplenium rhoicophyllum.*

To the botanical arrangement of ferns, much attention has been paid of late years, and with considerable success. The systematic writers of the 17th century touched this subject only lightly. Müller's *Historia Plantarum* distinguishes the spikied from the dorousferous ferns, and purposed to divide the latter according to the situation of the seeds on the edge or middle of the leaf, and according to the round or linear shape of the mass which those seeds compose. He then distinguishes them further into larger and smaller, owing, at the same time that he was not well satisfied with such a principle of arrangement; and finally subdivides them into such as have simple leaves, and such as have them simply, doubly, or triply pinnate. What concerns the situation of the seeds, or capsules, in this system is excellent, and is justly claimed by Ray as original. It forms, indeed, the basis of the Linnaean arrangement hereafter mentioned. But the shape or structure of the frond leads to no true generic distinctions, and yet Ray, loyalist of his original principles, distributes ferns according to these faulty ones, secretly observing how inconvenient they are, and retaining old names, without attempting to new-model them, or the genera which they had hitherto so imperfectly described.

Tournard, so lucidous of the genera of plants, attempted to distribute ferns according to the form of their fronds, but even this he performed in a most fundmental and imperfect way. His genus *Filix* indeed is tolerably characterized, after his principles, as having a pinnate leaf, and pinnatifid leaflets; his *Lenochitrus* has auricled leaflets; and his *Trichomanes* "generally roundish ones;" while his *Pteridophyta*...
Polypodium has a simple pinnatifid leaf. But his Ruta
muraria is strangely defined "with leaves somewhat
resembling garden rue;" his Filicula "with leaves somewhat
resembling those of Filis;" and his Adiantum "with leaves
known from other plants by their peculiar appearance," 
without indicating what that appearance is. Such a loose
mode of definition indicates a truly barbarous state of science.
He paid no attention to the situation of the fructification in
the different plants. Plancher, a very famous collector and di-locutor
of the species of ferns, followed his countryman Tournefort
implicitly in their generic arrangement, if it deferves to be so called, nor were any improvements in this line at-
ttempted till the time of Linneaus.

The system of the learned Swede would of course have
been imperfect, had he not undertaken to characterize all
the genera, even of his class Cryptogamia, as much as possible
by their parts of fructification alone, as far as such could be detected. Unfortunately, however, not only the essential organs of impregnation of ferns were then, as they still are, undetected, and the accessory parts of their
flowers nearly as obscure; while the structure of the fruit in
différent ferns was so much the same, in all known to
Linneaus, that it was useless for the purposes of generic
distinction. He was therefore obliged to have recourse to other principles, which, in the arrangement of plants with
evident flowers and variously-formed fruits, he had rejected as
unphilosophical; these were deduced from the situation of
the fructifications, and their aggregate figure, according to
the scheme indicated by Ray, but still carried into execute
by Linneaus.

Thus its genera appear differentiated in the first edition
of its Genera Plantarum.

Pteris. Fructifications disposed in a line, running along
the margin of the leaf on its under side.

Lunaria. Frut. in little crescent-shaped lines, under
the siphons of the leaf.

Adiantum. Frut. in oval spots, collected under the
reflected siphons of the leaves.

Asplenium. Frut. in straight lines, arranged on the
under side of the leaf.

Polypodium. Frut. in roundish spots, or dots, dif-
dered over the back of the leaf.

Acrolychnum. Frut. accumulated into one mass, en-
tirely covering the back of the leaf.

In the second edition of the same work two other genera
are added.

Hemionitis. Frut. in lines running into or interfetcting
each other, or branched.

Tricksmann. Caiax turbinated, solitary, erect, from
the margin of the leaf itself. Style bristle-shaped, ter-
minating the capsule. This last definition is incorrect in
terms, there being no authority for the use of the words
dyle and capsule in this case, and the former being indeed
merely a column, or elongated receptacle, to whose lower
part several capsules are indeed attached, but whose siphum
we are not warranted, by any analogy, to term a file, howerver appearances may be in favour of such a supposi-
tion.

In the 5th edition of Gen. Pl. a ninth genus is added,
while the arrangement of the former is a little altered.

Blechnum. Frut. disposed in lines, parallel with, and
near to, the rib of the leaf.

Nothing new on this subject occurs in the 6th edition of
the same work, the hall to which its author himself lent any
affinity, nor did he leave any thing relative to it in manu-
script.

Belcher, in his edition of the Gen. Pl. had added three
new genera, Marattia of Swart, Canoptera of Bergius,
and Menzies one of his own.

It is proper to notice what has been done by some contem-
poraries of Linneaus towards obtaining satisfactory
genetic characters of ferns.

Adanson, in his Familles des Plantes, published at Paris
in 1763, has noticed the membranous involucrum which
covers the fructification of most ferns; as has Gleditch in
his Système Plantarum, published at Berlin in 1764; but
they have detected this part in very few genera, and have
erred in several of their remarks concerning it. Thus in
the common brake, Pteris Linnaeus (Thebyteris of
Adanson, Cincinnia of Gleditch) whose involucrum is
manifest to the most careless observer, the former properly
describes that part as of one valve, in the shape of a pent-
house, while Gleditch absolutely denies its existence.

They both judiciously observe that the involucrum of Asplenium
Scrofulosum of Linneaus consists of two valves, but did not
say a word of its form in Blechnum. Hemionitis, or Lunaria.

"They have totally altered the Linnaean genera, but being
ignorant of any true principles, have made every thing
worse than they found it; and as to nomenclature, they have
gone counter to every maxim and all sorts of authority.

Both these writers have observed the pleated ring, which
binds together the capular valves of ferns, but they have
alike both equally erred, in denying the existence of any
such part in Polypodium vulgare!" It appears that both
these authors, who profess great originality, are not original
even in this error, for the slightest inspection of this very
common fern would have prevented it, none having a more
evident ring; they therefore could only have adopted it from
Tournefort, whom they do not quote, but who in his
figure and description has fallen into this unaccountable
mistake. Scopoli in his Flora Camioca has made use of
the remarks of Adanson and Gleditch, without correcting
the above faulty particulars, which he adopts on their
authority, though so very easy to be ascertained or refuted.

Haller and most other writers have made use of the Lin-
nean characters, with some occasional variations of no great
moment, either with respect to nomenclature, or the dif-
pollition of the species.

Indeed those who were conversant with European ferns,
or a few well-known exotic ones, only, would fearily find
any necessity of looking further than the Linnean generic
distinctions. But the writer of the present article was in-
dered only to consider the subject with attention, in con-
sequence of the vast collection of unsettled ferns of which
he became possessed in the Linnean herbarium, and
which were subsequently much increased by the unbounded
liberty of his friend Sir Joseph Banks. Many of these
could not be reduced to any known genus, and others,
tho the writer's technical characters possibly referable
to some, were yet too novel in habit as to require to be kept
generically separate. Many of these novelties were first
published at the celebrated Hedwig in 1756, in hopes of his
assistance; but nothing has transpired from him respecting any generic
reformations, though he or his son have since published a
few of the species.

The result of a general review of all the known as well
as nondescript ferns that could be got together, was a Latin
efay, communicated to the Royal Academy at Turin, and printed in the fifth volume of their Mémoires
in 1795, under the title of Tentamen botanicae de filicum
generibus dorserasum, autore J. E. Smith. In this the in-
volucrum, or membranous cover of the spores of capules,
was first brought into use for generic discrimination, and
particularly the direction in which it opens, whether out-
wards,
wards, that is, towards the margin or extremity of the frond, or inwards, towards the rib, nerve, or base, of the frond or its segment. This easy principle is found to lead to the most natural and distinct genera, without any exception. It does not overturn nor change one of those established by Linnæus, but more clearly defines them, while it affords means of ascertaining new ones. The part in question is found in almost every fern, covering the fructification before the latter comes to maturity. It originates sometimes from the margin of the leaf, but more commonly from some nerve or vein, in which half it is either lateral and parallel, or terminal and vertical. The involucrum adheres firmly to the frond on one side, whereas its nourishment, while growing is derived, and on the other is more or less closely pressed to, or sunk into a cavity in, its surface, without being really united with its cuticle, at least as far as can be observed. Not but that even on this side also the air is altogether excluded, so that in whatever mode the impregnation of the generis is accomplished, that operation must go on in secret under this covering, without any external communication, except through the falks by which the capsules themselves are attached, as the theory of Berchtold supposes; while Hadwig's implies an occasional elevation of the margin of the young involucrum, which we can find no reason to believe. When indeed the seed, seeds, and spores are arrived at maturity, the neighbouring parts, and especially the involucrum, dry up, the latter separating at the edge, and becoming crinkled or reflexed, to allow of the discharge of the spores.

In the Essay in question the Linnaean genera of dorciferous ferns were thus distinguished by characters taken from the involucrum, in addition to those by which they were previously known.

Acrisichne. Involucrum none, except little scales, or hairs, intermixed among the capsules.
Polypondium. Invol. uniloculic, separating nearly all round. Such species as have no involucrum were still retained here for further examination, they being then supposed very few.

Asplenium. Invol. originating laterally from a vein, and separating inwards; that is, towards the nerve or rib.

Hemionitis. Invol. in pairs, originating from the vein (which runs between the lines of capsules) and each separating outwards.
Blechnum. Invol. originating from the surface, continuing separating towards the nerve.

Pteris. Invol. from the inflexed margin of the frond, uninterrupted, separating on the inner side.

Lonicera. Invol. from the inflexed margin of the frond at each fuscus, in pairs, cresecent-shaped.

Adiantum. Invol. like scales, from the inflexed margin of the frond, divided, separating inwards.

Trichomanes. Invol. marginal, un-shaped, undivided, opening outwards, shorter than the column bearing the capsules.

To these the following new genera were added:

Davallia, distinguished from Asplenium by the involucrum separating outwardly, or towards the margin of the leaf.

Scopendrium, distinguished from Hemionitis, by its double involucrum separating inwards, the valves folding over each other.

Woodwardia, differing from Blechnum in having separate, short, or interrupted, vaulted involucrums.

Lindlea, published by Mr. Dryander in Tr. of Linn. Soc. v. 3.; differing from Pteris in its continued nearly marginal involucrum separating outwards.

Vittaria, having a double involucrum covering its long line of capsules, one valve from the margin, turned in, the other from the surface, separating outwards; its character combining those of Pteris and Lindlea.

Davallia, having a small scale-like involucrum to each round mass of capsules, terminating a vein or nerve, near the margin, or separating outwards.

Dicksonia of L'Heritier, having a double involucrum to each round mass of capsules, one from the surface, separating outwards, the other from the inflexed margin of the frond, embracing the former, and separating inwards.

Cyathia, bearing its capsulae in scattered hemispherical cups opening at the top without any lid.

Hypomorphium, having an involucrum of two flatth flattish valves at the edge of the leaf, opening outwards, longer than the column to which the capsules are attached.

Schiarea, having a double uninterrupted involucrum, formed of the inflexed edges of each linear appendage to the fronds, which bears the fructification.

All these genera have, or at least were supposed to have, a ring embracing each capsule; but it has since been observed that in some, as Schiarea, there is only an appearance of such a ring, as will be mentioned hereafter. Another section was subjoined, consisting of three genera unknown to Linnæus, whose capsules are not only decidedly delinete of a ring, but remarkably different in appearance and structure from the former, being sessile, naked, opening by pores.

The author termed these, as the former are annulata.

Glechonite. Capsules with three cells and three valves; partitions originating from the middle of each valve.

Marattia of Swartz's Prodrorus. Fl. Ind. Occ. Capsules oval, buried longitudinally on their upper side, with several cells in each division.

Davillia. Capsules of one cell, opening by a pore at their summit, and accumulated together in two parallel rows.

See in their proper places Cyathia, Davilla, Darea, Davallia, and Dicksonia.

This essay being republished in Germany, called the attention of the learned cryptogetic botanists of that country to the subject. Hence various tracts on the genera and species of ferns have appeared in different periodical publications, from the pens of Berdah, Wildenow, Mohr, and others. It was also published in English in 1798, in a volume of Travels by the author.

Several new observations were made, and mistakes corrected, by the writers just named. Mohr observed that the capsule of some ferns is only corrugated, so as to resemble a ring, but not really furnished with one, as in Schiarea. The same discovery was long ago made, but never published, by Mr. R. Brown. Onoclea, hitherto thought delinete of a ring, was proved to have one, and to be a true dorciferous fern. Several new genera were defined, but not in every case justly. Thus, the Siphonopteris of Bernhardi is more precisely a Cyathia, he having conceived a wrong idea of the latter genus, from some of the European Sphagnum certain species. His Wicklia is a Davallia, and his Ripidium a Schiarea. The good genera established by this and other writers will be mentioned hereafter.

At length the whole that had been done was revised and improved by the able Dr. Swartz, professor of botany at Stockholm, who published, in Schréder's Journal at Gottingen in 1800, the Genera and Species of Ferns arranged in systematic order, which work appeared in a still more perfect form, with a preface, descripisions of new or rare species, and several figures at Kiel in 1816, under the title of Synopsis Filicis. The family of Lycopodium and its allies are subject to a
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difficult natural order; a distinction to which we cannot assent.

We shall enumerate the genera of ferns according to Dr. Swartz's work.

Section 1. Ferns whose capsules are surrounded with an eliastic ring; called by him Filices Gyrita.

* Involucrum none.
1. Acrophyllum. Capsules forming an indeterminate spot or affembles, over the back of the leaf.
3. Hemionitis. Spots linear, forked and reticulated. Dr. Swartz separates from this genus such species as have an involucrum, by the name of Diplopygium.
4. Grammitis. Spots linear, direct, continued, foliary between the rib and margin on each side, parallel.
5. Polypodium. Spots roundish, scattered.

** Spots veiled with an involucrum.
7. Aspidium. Spots roundish, scattered, covered with an umbilicate, more or less circular, involucrum.

This consists of the whole tribe of Linnian species of Polypodium, which differ from the sulphur and a few others in having an involucrum, and of which we have already spoken. It is by far the largest and most troublesome genus of the whole order.
9. Dorea. (Called by Swartz Crecepis, after Berghius.) Spots linear, near the margin. Involucrum lateral, separating outwards.
10. Stenopteris. Spots linear, in pairs, scattered. Involucrum of two opposite superficial valves, folding over each other.
11. Diplopygium. (Hemionitis Smith.) Spots linear, scattered, in pairs, simple or branched, at each side of a vein. Involucrum of two valves, originating from the vein, separating outwards.
12. Lunulitis. Spots crescent-shaped, at the confines of the leaf. Involucrum from the inflexed margin of the leaf, separating inwards.
13. Petes. Spots linear, continued, marginal. Involucrum from the inflexed margin of the leaf, uninterrupted, separating inwards.
14. Pictaria. Spots linear, continued, longitudinal along the axis or near the edge of the leaf. Involucrum double, uninterrupted; one separating outwards, the other inwards.
15. Onoclea. Spots indeterminate, entirely covering the backs of some leaves. Involucrum from the membranous revolute margin of the leaf, either continued or interrupted, separating inwards.
16. Blechnum. Spots linear, longitudinal, continued, parallel, one on each side of the rib. Involucrum superficial, continued, separating inwards.
17. Woodwardia. Spots oblong, diminutive, lying near the rib. Involucrum superficial, vaulted, separating inwards.

The term superficial involucrum, involucrum superficial, expresses one that originates from the surface, not from the margin nor rib.
18. Lindsaea. Spots linear, continued, near the margin. Involucrum superficial, continued, separating outwards.
19. Adiantum. Spots roundish or linear, diminutive, marginal, growing upon the inner side of the membranous involucrum, which are formed out of the reflexed edge of the leaf, and separating inwards.
20. Cheilanthes. Spots roundish, diminutive, marginal, each covered with a distinct membranous involucrum, formed of the reflexed crenate edge of the leaf, and separating inwards.

This genus, established by Dr. Swartz, and named from Xanthes, the brim or margin, and a细心, a flower, comprehends 12 species in his work, some of which had previously been referred to Adiantum, others to Petes, and some even to Polypodium, which diversify of opinion among authors affords a strong presumption of their not agreeing well with any known genus, and consequently of the necessity of founding a new one to receive them. Accordingly the above character sufficiently distinguishes them from Adiantum, the only genus with which they could, in the present state of the science, be confused, by the fructification being seated on the leaf itself, and not on the scales which form the involucrum—Polypodium fragrans, Linn. Mant. 307; and a distinct species is called by Desfontaines, Fl. Adiant. t. 257; also Adiantum capense of Thunberg, according to Swartz, species of Cheilanthes.
22. Dicksonia. Spots roundish, separate, marginal. Involucrum double; one superficial, separating outwards, the other from the inflexed margin of the frond, separating inwards.

The proper character of this genus consists in the involucrum growing under the infection of the capsules, either in the form of a membranous undivided cup, as in C. arborea; (Polypodium arboreum; Linn.) and several others; or of a similar cup composed of numerous scales, as in C. borrida; (Polypodium borridum; Linn.) Whether some European species, as C. fragrans Fl. Brit., whose involucrum is a membrane enfolding the capsules while young, properly belong to the same botanists are not agreed, nor have those who have decided on this subject been furnished with proper materials for the purpose.

Section 2. Capsules of one cell, destitute of a distinct ring, opening by a longitudinal fissure on one side.—These are called by Swartz Filices spinar gyratae, because they have a wrinkled capsule, imitating the ring in the former section; or incurvata, alluding to the figure by which the said capsule discharges its seed.
26. Splecia. Capsules crowded, selloe, on the backs of several appendages to the leaf. Involucrum from the inflexed margin of each appendage, uninterrupted.
27. Lygodium. Capsules solitary, selloe, within the imbricated two-ranked scales, of terminal or lateral spiky appendages to the leaf.

The name, derived from lyglos, a twig or wand, alludes to the slender flexible habit. This elegant genus, which comprises the Ophioglossum fendant and flexuosum of Linnaeus, has been indicated by several writers. Wildenow has
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has named it Hydroglysum; Cavanilles Ugena; and Mirbel Raymundi. None can be more distinct.

28. Mobria. Capsules separate, sessile, at the edge of the leaf. Involucrum from the inflexed crenate margin.

A genus founded by Swartz in honour of his able cryptogamic friend Mobr, upon the Polypodium cafiforum Linn. by some referred improperly to Osmunda.


This genus is separated by Swartz from the following, chiefly because its capsules are sessile on a branched receptacle, not stalked and flattened on the back of a leaf, neither are they so much divided into two valves. The difference is rather difficult to define, but may be founded in nature.

Both genera are quite distinct of all involucrum.—The present consists of 17 species, amongst which are Osmunda phyllitidis, birta, bifurca, adventispi, bipinnatifida, and fibulatifolia of Linnaeus, all fine West Indian ferns figured in Plumiier.

30. Osmunda. Capsules crowded, stalked, naked, on the metamorphosed leaflets of the frond.

31. Todea of Willdenow. Capsules nearly sessile, on the transform, almost parallel, veins of the leaf, naked. The only species is T. africana. (Acrolochiium barbarum Linn.)


Confirms of fern species, one of which, M. furcata, is Acrolochiium furcatum Linn. figured in Plumiier, t. 28. This genus is scarcely distinct from the following.

33. Gleichenia of Smith. Capsules three or four together, sessile in a little hemispherical depression of the leaf.

It appears from this character that Swartz considers as separate capsules, what the author took for cells of one capsule, and analogy confirms the opinion of the former.

34. Athamia of Hoffmann. Capsules sessile, naked, placed in a double series, in little parallel neighbouring spots, all together forming a longitudinal line near the margin.

The only species is A. excisa, a most elegant large fern, found in the South Sea and Philippine islands.

Section 3. Capsules deliquescent of all traces of a ring.

* Capsules of many cells.

35. Marattia of Swartz. Capsules oval, scattered, at first closed, then separating into two parts, and discharging two rows of cells, opening by the top.

36. Drynea of Smith. Capsules oblong-linear, transform, parallel, immersed in the frond, with two rows of cells, opening at the top.

* Capsules of one cell, with two valves.

37. Botrychium of Swartz. Capsules distinct, sessile, crowded into a cluster, bursting transformely. Separated by Swartz from Osmunda, and containing our O. lunaria, &c.

38. Ophiochyron. Capsules united into a two-ranked, somewhat jointed spike, bursting transformely.

The Lycomonoideae of Dr. Swartz we consider as no less genuine filices than the foregoing. They have an herbaceous, or bristly, leafy item, with axillary fructifications, and may be defined as follows.

Section 4. Capsules axillary, naked, of one, two, or three cells.


This is a large and beautiful genus, comprised amongst others by Dillettii and Linnaeus, from which its fruit totally differs. Nothing is known respecting the flower or impregnation.

40. Tmesipteris of Bernhardi. Capsules of two cells, with a transformely structure.

T. colonnes, a New Holland plant, is the only known species.

41. Pileatum of Swartz. Capsules of three lobes and three cells.

Confins of Lycepodium nudum of Linnaeus, and one more species. They have leaves, though small ones, analogous to those of Lycepodium, and the capsules are really axillary.

Cavanilles, in his Letters on Botany in Spanish, published in 2 ed. 8vo. at Madrid in 1803, has adopted the same principles of arrangement, carefully acknowledging whence he has derived them, and describing many new ferns from the East and West Indies. Swartz refers to this work, which is the more necessary, as their generic names often differ.

One of the latest writers on the subject is Professor Sprengel of Halle, who, in his Letters on the Study of Cryptogamous Plants, already mentioned, treats copiously of ferns, both physiologically and systematically. The author does not seem to be aware of the former to whom he is obliged for his leading principles and generic characters, having apparently never been above-mentioned Eifflay, though he properly mentions "the excellent Swartz," whole treatise, as it stands in Schrader, he might very well take to be original; neither has the translator corrected this omission, which we are well assured is an accidental, not designed, injustice.

Sprengel establishes the following genus upon the European Cyatheae.

Athyrium. Capsules in small, scattered, round spots, on the whole lower surface of the frond. Involucrum fixed on one, mostly the inner, ridge, and commonly opening towards the margin.

This definition is not sufficient to give a clear idea of the supposed genus, which, as far as concerns the species that we have all along referred to Cyatheae, ought to be characterized as having a lacertous involucrum, enclosing the masts of capsules, and infesting beneath them. The reformers of Cyatheae have not had access to the whole series of species which appear to us to connect these with the primary one.

But however this may be, we are persuaded several of Sprengel's Athyria belong rather to other genera, from whence he has removed them.

We cannot take leave of Professor Sprengel without which is far from excellent compiled matter, without grounding our readers against a position in his 6th letter, p. 74. "The only character," says he, "that can be derived from the fhape of the fruit, in the classification of ferns, is the presence or want of the annulated ring of the feed-veils. From this therefore they may be divided," the ought rather to have said they have been divided, into annulated, with a ring, and eomnulated, without a ring; but this is an artificial, not a natural character; for the genus Onches, whose feed-veils are annulated, approaches very near to Osmunda, whose capsules are without a ring; and Polypodium is closely related to Marattia, Paris to Athamia, and Digites to Digites. This is too extraordinary an assertion, as to shake our confidence in the author's judgment and observation to the very foundation. No ferns, no plants of one natural order, are more distinct, unlike, and effectively different from each other than these, inasmuch that we cannot account for, nor trace, the chain of ideas which caused them even to be compared. We must repeat that nothing is more natural or absolute than the distinction between annulated and eomnulated ferns, nor between either of these, and such as have a wrinkled, or partially annulated, capsule. The writer of the present article honestly confesses that the discovery of the latter tribe at first made him doubt the fidelity of the distinction as far as
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ferns with single capsules were concerned; nor had he
leisure to resume the subject, before Dr. Swartz's publi-
cation removed every scruple, and set the matter at rest.
About the _teccco_ (Marattia and Danae) there could never
be any uncertainty. Their fruit is so unlike the annulated
ferns, that to term them _annulata_ seems to imply a fort
of affinity or resemblance, (independent of the ring,) for
which there was no foundation; another term was there-
fore contrived, but it has not been adopted. The author
is the more ready to regret it, as he has ever found the
necessity of keeping a watchful eye upon the invention of
new terms, in this and other branches of natural history,
which are often but a substitute for a deficiency of new
ideas.

Thus the German writers are pleased to call, after Hed-
wig, the feed-veil _sporogium_, though _pericarpium_ is of
precisely the same meaning, and has long been established.
Professor Swartz rightly uses _capitula_, which moreover
expresses what sort of feed-veil is intended. Yet the latter
prefers _genesis_, a new botanical word, to _annulus_, because, it
ferns, _annulus_ is used in _fungi_, as if there could be any
ambiguity or confusion! Jullienow and Swartz call the
involution _indigium_, (a cover,) which we think needless,
because the part correctly answers to the Linnaean idea, as
well as to the true meaning of the word _involution_, and has
long been so called. Cavanilles names it _segmentum_, and
Hedwig _perisporegium_. So the latter calls the ring _fylpklakium_,
and Palhott Beauvais names it _annulus_. There is no end
to such futile and reprehensible changes. _Seri_ of Swartz
may be advantageously admitted for the spots of fructi-
fication, which cannot always be called _pamula_ or dots,
being sometimes linear, and sometimes broad and unlimited,
so that the terms _lineae_ and _maculae_ have been reserved to:
whereas the word _foris_ spots, comprehends every different
shape.

We have in another place, Introduction to Botany, p. 388,
put in a protest against a corruption of the generic nomen-
clature of ferns, on which subject we shall here be very
brief. Several of the new names are compounded of _Peltis_,
a fern, and some other word. Now if these are allowed to
remain, some such distinctive syllables might be prefixed to
the old genus _Peltis_ of Linnaeus, to get rid of the latter;
else a very found Linnaean law is needlessly infringed, which
forbids forming new generic names of already established
types, combined with another word to give them a new
meaning. All writers, before they publish, should study
and observe these matters, that science may remain uncor-
rupted and unobfeured.

In the above general synopsis of ferns we have laid
nothing of _Phylidaria, Liottia, Marjela, Selasia_, and _Equis-
feuam_, which have generally been considered as belonging to
this natural order, but they ought rather to compose a new
one. It is hinted in the Flora Britannica that the two first
might perhaps be removed to _Menocia_ in the artificial sys-
tem, and if the last should remain among the _Phylidae spinata_,
see _Equisetum_, it can only be on artificial principles.
_Marjela_ and _Selasia_ we have never critically examined,
but they seem near akin to _Phylidaria_, and are likewise per-
haps monocious.

Of the Books containing figures of ferns, Plumier's
splendid volume of Outlines is the most valuable. Pictet
has copied it on a diminished scale. There are many East
Indian species in Rheed and Rumphius; some from all quants
in Plukenet. The younger Hedwig, now alas no
longer surviving his father, has published several coloured
plates of this tribe; but no plants lefs require this additional
illustration, being all so much alike in colour. Many Euro-
pean ferns are delineated in the Flora Daukea, and English
Botany, and a few in Dutilh's Herbarie de la France.
Lamarex has given several of the new genera, with the old
on his general plates—Ferns are usually dried and pre-
furred in a herbarium; no other plants being so little attacked
by insects.

Propagation and Culture.—Of the propagation of ferns
by seed we have already spoken. Shade and moisture are
requisite for the success of the experiment; and the feed-
lings are of extremely slow growth. Ferns of cold countries
are in our gardens hardly perennial, generally requiring a
moist and shady situation, and slowly increasing by root.
Those of hot climates are many of them beautiful trees,
and when not too large, well worthy of culture in our flower.
The _Dicksonia arborea_ from Madeira is so preserved in a few
curious collections, but does not succeed very well. _Poly-
phodium aureum_, _Decaxia concinnum_, and _Woodwardia radi-
ante_, are easily kept in a greenhouse, and increase slowly by
means of their creeping roots. We have been growing in
the hove of Mr. Evans at Stepney in 1825, the _Toila
africana_, Wild. Rare Fern, t. 5, in full fructification.
It was said to have been brought from New South Wales, but
possibly that might be a mistake, as we have often detected
such in the reports of those who bring plants from remote
countries. It is not however impossible that this fern may
grow in New Holland as well as Africa, in which case it
will only afford a fresh instance of the improbity of names
of countries for specific appellations.

FILICULA, a little fern, was by Tournefort applied as a
generic name to some of the smaller kinds of ferns, which he
peremptorily from others merely on account of their size. They
belong to various genera, and have no good natural nor arti-
tificial characters.

FILIGRANE, FILIGREE, or FILIGRE-VOEK, a kind
of enrichment on gold or silver, wrought delicately, in
manner of little threads or grains, or both intermixed.

The word is compounded of _fil_ or _flum_, thread, and
granum, grain. In Latin it is called _filtrum elegantium opus_
_argentum_ aureum: but this is to be understood as alluding to
the latest Latin writers, for _filtrum_ occurs only once in
Lacerti, who applies it only to wooden thread. In this
kind of work fine gold and silver wire, often curled or
twisted in a serpentine form, and sometimes plated, were
wrought through each other, and folded together so as to
form fillons, flowers, and various ornaments; and they were
also sometimes melted together by the blowpipe into little
balls, by which means the threads became so entwined as to
have a very beautiful and agreeable effect. It was formerly
much more employed than at present, in the manufacture
of small articles, which served more for show than for use;
such as vases, needle-cases, vases to hold jewels, small
boxes, particularly shrines, decorations for the images of
saints, and other church furniture. This art, however, is of
great antiquity; and seems to have been brought into
Europe from the East. Among church furniture we meet
with filligree work of the middle ages. The Turks, Ar-
menians, and Indians make at present some matters-pieces of
this fort, and with tools that are exceedingly coarse and
imperfect. Articles of this nature, which are very pretty
and elegant, are manufactured in the Deccan, and also in
China, where the filligree work is mostly wrought of silver;
but this is much inferior in delicacy of workmanship to that
of the Malays, described by Marsden, in his "History of
Sumatra," p. 140, &c. In this island it is universally
used and worn; and the goldsmiths who are employed in it
are settled every where along the coast. The surprising
delicacy of the work is the more extraordinary, as the
tools employed in it are very rudely and inaccurately formed by the goldsmith, from any old iron which he can pick up. The gold is melted in an earthen rice pot, in a crucible of ordinary clay. In general they use no bellows, but blow the fire with their mouths, through a joint of bamboo. and when the quantity of metal to be melted is considerable, three or four persons sit round their furnaces, which is an old broken iron pot, and blow together. At Padang alone, where the manufacture is more extensive, they have adopted the Chinese bellows. When they have drawn the wire to a sufficient fineness, much in the European manner, they flatten it, by beating it on their anvil, and then give it a twist, like that in the whole bone handle of a punch ladle, by rubbing it on a block of wood with a flat file. After twisting they again beat it on the anvil; and thus form a leaf or element of a flower in their work, which is cut off. The end is again folded and cut off, till they have got a sufficient number of leaves, which are all laid on figly. Patterns of the flowers or foliage, in which there is not much variety, are prepared on paper, of the size of the gold plate on which the filagree is to be laid. They then begin to dispose on the plate the larger compartments of the foliage, for which they use plain wire of a little size, and fill them up with the leaves before mentioned. To fix their work they use a glutinous substance, made of a red berry called boa fago, ground to a pulp, on a rough stone. This pulp they place on a young cocoa-nut, about the size of a wall-nut: the top and bottom being cut off. The juice of the cocoa-nut serves probably to keep the pulp moist, which would otherwise speedily dry and become unfit for the work. After the leaves have been all placed in order, and stuck on, bit by bit, a folder is prepared of gold filings and borax, moistened with water, which they blow over the plate, and then putting it on the fire for a short time, the whole becomes united. In executing the open work the foliage is laid out on a card, or for kind of wood, and stuck on with the fago berry: and the work, when finished, being covered over with their folder, is put into the fire, when the card or soft wood burning away, the gold remains connected. If the piece be large, they folder it at several times. When the filagree is finished, they cleanse it by boiling it in water, with common salt and alum, or sometimes lime-juice; and in order to give it a fine purple colour, they boil it in water with brimstone. In making little balls, with which their works are sometimes ornamented, they take a piece of charcoal, and having cut it flat and smooth, they make a small hole in it, which they fill with gold dust, and this, melted in the fire, becomes a little ball. They are very expert at filing and polishing the plain parts, hinges, ferrules, and the like, being in this as much excelled by the European artists, as these fall short of them in the fineness and minuteness of the foliage. The price of the workmanship depends upon the difficulty or uncommonness of the pattern. In some articles of usual demand, it does not exceed one third of the value of the gold; but in matters of fancy it is generally equal to it. This art is now neglected and little esteemed in Europe. Augsburg, however, a few years ago, had a female artist, Maria Euphros. Reinhard, celebrated for works of this kind, who died in 1779. In 1769 she ornamented with this work some silver boxes, which were sent to Russia for the use of the church, and which gained her great honour.

The term has been lately applied to ornamented works, formed, as fancy directs, of strips of paper, differently coloured, rolled into various figures, and artistically combined.

FILING, in Mechanica, is the operation of using a file in cutting away and reducing various substances into any required form. The file is chiefly confined to the working of metal, though it is occasionally applied to wood, ivory, bone, &c. The art of filing is an essential to every workman in metal, and it requires great practice and skill to perform it well; the principal difficulty consists in filing a flat plane and even surface to any piece of metal. To do this the work must be held firmly in a vice, so that the surface to be filed be truly horizontal; the workman then files it over with a file, adapted in its cut, or size of its teeth, to the magnitude of his work: in doing this, if it is large, he takes one end of the file in each hand, holding it firmly, as he moves it backwards and forwards, in a horizontal plane, taking care not to lean heavier upon one end of the file than the other. The file only cuts in going forwards; he must therefore press harder upon it, that it may take hold of the metal: in drawing it back it is unnecessary to lean on the file, because it is not then adapted to act; it is usual, in filing a piece of flat work, to begin at one side, and every time the file is drawn back, to move it sideways at the same time about the breadth of the file: the next stroke proceeds slantly forwards, as before, but in a fresh place, unless some sudden incrustation is to be removed; then two or more strokes should be made in one place, or the pressure on the file increased till all is brought to a flat or even surface. When the whole of the work has been done over in one direction, it is then filed in the same manner at right angles thereto, and afterwards diagonally, till it is finished, trying it occasionally by a straight edged ruler. Some workmen, by long practice and experience, are able to make the work flat by filing in one direction only, and without any trial; so that if two surfaces of metal thus filed are placed one upon the other, they will adhere together for an instant if the upper one be suddenly lifted up. The height of the piece, in which the work is held, is a matter of some importance in filing: if the work is large, it should be about forty inches above the floor on which the workman stands; for small work it may be higher, because the workman does not need to bear so heavily on the work. In filing articles which are to be fitted together, the workman makes use of bevels, gauges, rulers, compasses, &c. to mark out and try the work. Round pins, &c. are held in a hand vice, and supported on a piece of wood while they are filed, and the workman turns them round while he files, in order that they may be truly round and have no angles.

The file-makers in Lancashire, for cutting the teeth of their small files, sometimes make use of a knife, fig. 5. Plate XII. Missett, which has a bevelled edge; the workman uses it in the same manner as the chisel, except that no hammer is employed. The finest files used by watch-makers have sometimes as many as 350 teeth per inch, which are frequently cut by the knife; other watch-makers' files are cut in the manner above described, by the chisel, fig. 6, which is struck on the head by a small hammer. The smallest chisels used are not a vast deal larger than the figure, and the hammer, fig. 7, is the full size, though the handle in reality is somewhat longer; some of very fine watchmakers' files are not larger than needles, and are called needle-files.

FILIPENDULA, in Botany, so called because the knobs of the roots are pendulous on threads from the main root. Town. Inf. 293. 1. 150. See SPIRA.

FILIPPOPOLE, or Filippope, or Filide, in Geography, a town of European Turkey, in Romania, on the Maritz, where it becomes navigable; founded by Philip, father of Alexander the Great. In the year 200 it was taken by the Goths, who are reported to have massacred 100,000 persons in the sack of this city; and in 1670 it was taken by Amurath I. emperor of the Turks; 50 miles W. N. W.
of Adrianople, and 124 W.N.W. of Constantinople. This
town is nearly built, without fortifications, or one good
street. Its situation is low and moist, and the mud is
two feet deep, and fomes, like pools, are set up
to facilitate the progress of foot-passengers. Nevertheless,
it is a place of considerable size. N. lat. 43° 22'. E. long.
24° 44'.

FILITZ, a town of Germany, in the principality of
Culmbach; six miles S. of Kirch Laimitz.

FILLUS ANTS PATREM, q. d. the fox before the
father; a denomination applied by botanists and florists to
plants whose flowers come out before their leaves. Such
are the several species of colchicum, or meadow-saffron, the
colt's foot, butterbur, &c.

FIL IX, in Botany. See Ficllces and Fern.

FILL, in the Sea Language, is to brace the sails in
such a manner, that the wind entering their cavities from
behind, dilates them, so as to advance the ship in her course,
after the sails had been for some time thrashing or braced
back.

FILLER, in Geography, a town of Hungary, taken by
the Turks in 1554, but soon after recovered. Its fortifi-
cations are destroyed; 40 miles S.E. of Cremona.

FILLER, a term often provisionally used to signify
the horse which supports, and is placed between the shafts
carts or other carriages. It is commonly written thiller.
See Thiller.

FILLET, in Anatomy. See Frenum.
The word is French, fillet, formed of fil, thread.

FILLET, or Fillet, in Architecture, denotes a little square
member or ornament used in divers places and on divers oc-
casions, but generally a corn of corn in a greater
moulding. The fillet is the same with what the French call
reglet, bande, and bandelette; the Italians, linta, or lyella.

FILLET, in Botany. See Thread.

FILLET, Tenisla, in Heraldry, a kind of orle or bordure,
containing only a third or fourth part of the breadth of the
common bordure. See Bordure.

It is supposed to be withdrawn inwards, and is of a
different colour from the field. It runs quite round near
the edge, as a lace over a cloak.

FILLET is also used for an ordinary drawn like the bar
from the fuller point of the chief across the shield, in
manner of a scarf; though it is sometimes also seen in the situ-
ation of a bend, fesse, fosse, &c.

According to Guillim, the fillet is a fourth part of the
chief, and is placed in the chief point of the escutcheon.

FILLET, in Midwinter, a contrivance for the purpose of
extracting the child, in difficult births, when the head is
too large to pass readily through the pelvis. The invention
is probably very ancient, as it is mentioned by Avicenna,
as well known in his time; that is, towards the end of the
tenth century. The frappled, and probably the full con-
trivance of the kind, was made by cutting, in a strong flip
of cloth, a flit, sufficiently large to embrace, and take into
it, the head of the child. This was carried up into the va-
gina, upon the hand of the accoucheur, and passed over the
face of the child, and lodged under the chin, or over the
hind-head, and pressed close to the nape of the neck; the
hand was then withdrawn, and the child extracted by pulling
down the other end of the cloth. But as it was difficult to
keep the noose open, so as to make it embrace the head of
the child; this defect was attempted to be remedied, by
making a fisell, with a flip of strong cloth, two feet or
more in length, through which a thin piece of whalebone
was paffed. The noose being carried over the head,
FILLY Fowl, a term implying a mare or female fowl. See FOAL.

FILM, a thick skin or pellicle. To place it is often in a used for that thin moist fkin which separates the foods in the pond, and keeps them apart.

FILM, White, on the eye of a horse, may be removed by lifting the eye-lid, after the eye has been washed with wine, and floaking it gently with the thumb with wheat-flour: common salt and salt of lead, beaten fine, and put into the eye, are proper to consume a film; or the horse’s eye may be washed with the spittle in the morning, failing, having first put a little salt into your mouth; but there is nothing so effectual as sal ammoniac, beaten and put into the eye, and repeated every day till the film is gone.

FILMER, Edward, gent. in Biography, in 1629, collected, translated, and published, “French Court Ayres, with their ditties, Englishd, of four and five parts, dedicated to the Queen,” vol. These all were chiefly composed by Pierre Guerdon, with two by Anthoine Doffret. There is very little musical merit discoverable in these songs, which are, however, highly extolled in several copies of verses prefixed to the book, and, among the rest, in one by Ben Jonson. The editor seems to have taken great pains in translating the words, “totidem syllabis,” in order to accommodate them to the original melodies.

FILOPONKAJA, in Geography, a town of European Turkey, in Dobrouzze Tartary; 18 miles S.S.E. of Fismal.

FILOQUIA, Filloquial, or Jerozol, a town of European Turkey, in Livadia, on a river which runs into the gulf of Arta. It was anciently called Amphioleia, or Argos Amphioleium, and, although once a celebrated town, it was ruined by the war between the Venetians and Turks; 44 miles N.N.W. of Lepanto.

FILTER, or Filtre, in Chemistry, &c. a piece of woven cloth, linen, paper, or other matter, some of which are in the form of hollow inverted cones, used to filter or strain liquors through. The filter has the same use and effect with regard to liquids that the fusee or scarce has in dry matters. Filters are of two sorts: the first are simple pieces of paper or cloth, through which the liquid is passed without further trouble. The second are twisted up like a thin or wick, and filter wetted, then squeezed, and one end put in the vessel that contains the liquor to be filtered; the other end is to be out, and hang down below the surface of the liquor; by means of this the purest part of the liquor diffils drop by drop out of the vessel, leaving the coarser part behind. The filter or philtre acts as a siphon.

FILTER is also an apparatus used to separate water or other fluids from any foreign matter it may contain; this is effect ed by causing the water to percolate through an infinite number of apertures of various size and shape, which are too minute to allow the passage of any substance mixed in the water; by this means, the moist foul water, after passing through such a filter becomes perfectly transparent and sweet, though at the same time it is not deprived of any of its qualities which depend upon matter entering into combination with it; only such as depend upon mechanical mixture being arrested in its progress through the filter.

The great utility of filters for domestic use must be evident, as a filter is for culinary purposes can be obtained from any patrid and muddy water; on this account the construction of apparatus, which will at the same time be cheap and efficacious, is a desirable object; and a vast variety have been contrived, many possessing great advantages.

The filter in most general use is a basin formed of some porous kind of stone, and supported over any convenient vessel to receive the filtered fluid. The foul water being poured into the basin, inimmates itself by flow degrees through the minute pores of the stone, and is collected, drop by drop, into the receptacle placed beneath. This apparatus answers its purpose perfectly well for a time, but has its defects: the constant accumulation of the impurities in the basin, in time choked up the aperture of the stone; this may be removed by washing many times, but the more minute particles of matter are, by insensible degrees, carried down into the stone, fill up the pores, and at length no water will pass through. A trilling error is also committted in the form of the vesell, which is in general a hemisphere; in this figure the preffure of the fluid is greatest in the lowest point, and gradually diminishes in every other part, so that unless the preffure is greater in the centre than it ought to be, scarcely any water will pass through the other parts. A more eligible form would be that of a cylinder, formed either of earthenware or metal, with a circular plate of the filtering stone cemented into it at the middle; by this means, the preffure on all parts will be equal, and it would have another advantage, that when the water began to pass slowly through the stone, by inserting the cylinder, the filtrate would be filtered in a contrary direction, and act to remove the more matter deposited in the pores of the stone by the preceding process.

The filter proper for contructing filters, is of no means scarce; in London is a very porous lime-stone containing innumerable fragments of broken shells is employed; it bears strong reliance to the ragstone found at Barnack near Stamford, Northampton; a grit-stone, procured at Bircher and Stanton Moor near Winster in Derbyshire, is found to be well adapted for filters, which are carried all over the country. The expense of stone filters, and their liability to be choked up by long use, have given rise to many others more simple; sand finely washed, pulverized glass, pottery or charcoal, are frequently employed, being placed in a proper situation for the water to percolate through them. The latter, from its well known antieptic quality, is peculiarly adapted to correct putrid water, at the same time that it separates its impurities. Mr. John Isaac Hawkins, Tithe eld street, has established a manufacture of charcoal filters for the supply of the metropolis where the water in general requires such purifying agents.

Figs. 8 and 9, Plate XIII. Mistislan, represents two constructions. The latter is on a large scale, and constructed in a cafl A B C D, divided into two compartments by a vertical partition, E F, which does not reach within two inches of the botton of the cafl; the space a b d c is filled with charcoal, at first a stratum of coaly powdered charcoal four inches deep, and this is covered with another stratum of four inches, in pieces about the size of walnuts; in each division of the cafl the charcoal is covered with a perforated cover, the foul water is poured in on the side, A B E F, and is forced by its preffure down on the side, and up on the other, through the charcoal, in which it devours its extraneous mixtures, and rives in the fide, E F, perfectly transparent and sweet; it is drawn off for use by the cock a; at e is a cover to prevent the foul water being accidentally thrown on the wrong fide; the cafl is of wood, and charred with fire, to still further sweeten the water.

The filter in Figs. 8, is on a smaller construction; here A is the vesell for the foul water, furnished with a cock a, delivering the water in the spout b, of a second vesell B, containing the filter; it is filled with charcoal as high as the cover c, which prevents the small charcoal being disturbed by the entrance of the foul water, which, after percolating through the filter, escapes at the tube d into the inferior reservoir, where it is retained until wanted, when it.
F I L

is drawn off at the cock $c$. The cask filter is two feet eight inches in height, twenty-two inches diameter at the bottom, and sixteen inches at top; if constantly supplied with foul water it will purify one hundred gallons per day; its inventor strongly recommends it for the use of ships; the other filter, which is made of earthenware, and a much smaller size, will do a proportionate quantity; when the charcoal becomes foul it may be taken out and replaced, at an inconsiderable expense; sand, pounded glass or pottery, and other substances, have at times been recommended. Professor Parrot constructed a filter with sand; its form is an inverted siphon, the curve of which is filled with sand washed exceedingly clean, a constant stream of the foul water enters at one side of the siphon, and passing down through the sand in one leg, rises through the other, escaping on a level rather lower than it entered. Great stress is laid by the inventor upon the filtration by ascent, as well as descent; as he supposes the more weighty particles will subside; though from their exceedingly small size, they might escape through the interstices of the sand. It will be easily seen that the slip filter by Hawkins is the same in effect, though on a better construction.

Mr. James Peacock took out a patent in 1791 for filtration by ascent through any of the above-mentioned substances; but he does not describe any thing material which we have not mentioned above.

The filter delineated in fig. 10, is a contrivance of Mr. Cullen, and described in the Philosophical Magazine; A B C D is an ordinary cask divided into three parts by three horizontal partitions; the upper division A B a b is to contain the reservoir of foul water; the partition a b is perforated, and allows the water to pass slowly down into the middle division filled with broken corkery ware, presenting innumerable surfaces upon which the water deposits any matters which will subside; the cask is perfurred all round to admit air at a b; the water then passes into the inferior compartment which contains the filters; these are three cylinders, one of which is seen at D; they are formed of argil and silex baked together in a potter’s kiln. The water percolates through this substance, and is received into a vessel E communicating with the filters, formed of metal, and furnished with a cock at r to draw off the clear water; F is a metal tube placed upon the top of the vessel E, with which it communicates, and in which the water rises as it accumulates in the reservoir; a cock at f will draw off the foul water, and the tube F, being full, or nearly, of the filtered water, the pressure will be reversed, and the impurities lodged in the pores of the cylinders removed by the contrary action.

To the inhabitants of a large city the filtration of the water they make use of is a matter of considerable importance, but the practice is at present confined to apparatus on a small scale for the use of one family only; filters on a large scale might be simply constructed, and the expense of land for their formation would be amply repaid by the improvement of the water. The construction of the slip filter leaves itself adapted for this purpose, a large tank lined with brick-work, and divided into two by a wall which must have every other brick of the lower course omitted, so as to leave apertures at the bottom of the wall; this tank being filled two feet deep with pulverized charcoal would form an excellent filter, and several of these being arranged round the steam engine for pumping the water would alterately supply it. The expense of charcoal might be obviated by using the refuse or charcoal as it is term, or sawdust might be charred in an iron retort at a small charge. See Filtration.

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Filter, or Flitter, is also a charm, supposed to have a virtue of inspiring love.

The word is derived from φίλληρα, which signifies the same thing, of φίλος, amio, I love.

The Greeks, when their love was without success, had several arts to procure the affections of their beloved. The Thessalian women were famous for their skill in this, as well as other magical practices. The means whereby it was effected were of divers sorts; it was sometimes done by potions, called φίλληρα, which are frequently mentioned in authors of both languages. Juvenal speaks thus:

"Hic magicus effert cantus, hic Thessalae vendit

Philitra, quibus valetas mentem vacare marit."  

Their operations are violent and dangerous, and commonly deprived such as drank them of their reason. Plinarch and Cornelsus Nepos report, that Lucullus, the Roman general, first loft his reason, afterwards his life by one of them. Lucertus, the poet, ended his life by the same way; and Cassius Caligula, as Suetonius reports, was driven into a fit of madness by a filter given him by his wife Cleopatra, which flies was mentioned by the same poet. Ovid likewise affirms us, that this was the usual effect of such potions.

The ingredients they were made of were of divers sorts, few of which, applied by themselves, were thought effectual.

FILTRIA, in Geography, a town in Sweden, in the province of Sodermanland; 10 miles S.W. of Stockholm.

Filtration, the act of passing any liquid through a filter, called also siphonation, procuration, and transmutation. See Filter.

The end of filtration is of two kinds; the one to free fluids from any solid bodies of a feculent nature with which they are mixed; and the other to separate any precipitated powder or other solid body from superfusible fluid; and the means must be varied accordingly. Such liquors as are incorporated with particles that adhere to them are rendered capable of filtration by coagulating and collecting the heterogeneous parts. This is effectually either by boiling or by mixing whites of eggs and boiling them with the turbid liquors. See Clarification.

Filter is the most commodious way of filtering is by white-brown paper, or paper without size, fastened over the mouth or aperture of a funnel; the small hairs of the pores of this paper admits only the finer parts through, and keeps the rest behind. There are also filtrations through sand, pulverized glasses, &c. Spirits of vitriol, salt, and nitre, are filtrated through a quantity of beaten glafs in the bottom of a funnel.

Filtration is also performed by a woollen or linen bag, called Hippocrates’s sieve: the choice of these must be directed by the liquor to be filtered.

Dr. Papin contrived a method by which filtrations through cap-paper might be made suddenly, and with great quantities of liquor, by the help of the air-pump. For this purpose he made use of the following contrivance: A A (Plate XIII. Miscellany, fig. 11,) is a glass receiver; B D a cover fitted to it; C C E is a pipe forming the communication between the receiver A A and the air-pump; D D a hollow vessel full of little holes; F F a pipe that makes the communication between the vessel D D and the receiver A A; F F a vessel to contain the liquor to be filtrated, and G G the plate of the pump. When this instrument is used, the hollow vessel D D ought to be tied about first with linen cloth, and then with cap-paper, so that no liquor may get into the holes of the said vessel but through the cap-paper, and linen cloth; this must be wholly placed.
placed within the liquor to be filtrated: let the air be extracted by means of the air-pump out of the vessel A A. Then the liquor in the vessel F must be drawn through the cap-paper, and the linen cloth into the vessel D D, and from thence through the pipe E E into the vessel A A; and this operation must be quick, on account of the great pressure of the atmosphere that drives the liquor; besides, the sediment of the liquor filling at the bottom of the vessel F must be drawn up, to drop the grains of the cap-paper as in ordinary filtrations. Buch's Hill, of the Royal Society, vol. iv. p. 356, &c.

Filtering flasks and filtering basons, either natural or artificial, for the purpose of purifying water, are not unfrequently used in this and in other countries. Rocky mountains, beds of sand, gravel, &c. are natural filters. The composition for making filtering basons, in order to purify water, consists of equal parts of tobacco-pipe clay, and coarse sea, river, drift, or pebbled sand. The basons are formed and turned on a potter's wheel, and they should be about 2 of an inch thick. When the vesicles are of the usual degree of dryness, the whole outside and inside surface must be shaved or turned off on a potter's wheel and, when perfectly dry, these basons are burnt or baked in a potter's kiln after the usual manner. Many patents have been obtained by different persons for filtering machines of their own invention. See Filter.

The secretion of the divers juices in the body from the mass of the bawl seems to be little else but filtration. Pic- cairn, and other late authors, hold that the diversity of filtration does not depend on the different configurations of pores, but on their different sizes or diameters.

Springs also seem to be raised from the ocean by the same principle of filtration.

Filtration, in Pharmacy, is chiefly concerned in tinctures; as when some portion is drawn from the ingredients or suspended in the tincture which is not necessary to it, but disturbs and renders the rest unpalatable both to the palate and sight. Besides this, there is a filtration which has much tortured the philosophy of some ages to account for; this is that performed by the ascent of the finer parts of a liquor up a cord or slant of cotton, or such like matter, which is contrived to drop over another vessel and leave the groffer behind.

After the same manner it is, without doubt, that the humidity of the earth is drawn up into the substance of the roots of vegetables, which we know consists of long and very minute fibres, so disposed as to form a great number of tubular interstices; these act in the nature of this sort of filter, and attract the juice and moisture appointed for the nutrition and increase of the plant.

Some say, that the cause of this ascent is because the liquor swells those parts of the filter that touch it, by entering into the pores of the threads which compose it, whereby they rise up, touch, and wet those next above them; and these again the next threads; and so on to the brim of the vessel, when the liquor runs over, and descends in the other part of the filter which hangs down by its own natural gravity.

But this account is liable to many objections, especially as liquors rise after the like manner in glasses tubes much above the surface of the liquor they are immersed in, where the glasses cannot be imagined thus to swell.

Others account for it, by considering every filter as composed of a great number of long, small, solid bodies, which lie very close together; so that the air getting in between them loses much of its pressure, and cannot gravitate so strongly as it doth on the fluid without them; the con-
1763, and an elegant composer. His pleasing productions for various instruments were soon noticed and admired; but alas! death stopped his career in the prime of life, before his genius and talents were well developed. In 1768 the musical world was robbed of this young artist, of whom, from the specimen he had already given of his abilities, the highest expectations were formed. In Paris and Amsterdam the following compositions appeared before his decease, six symphonies, six violin trios for the harpsichord, violin, and bass. Two were printed four, the Paris copy, by Brevis, as were most of his symphonies. Nothing was ever so elegant, and at the same time so cast, as his harpsichord trios. He left behind him in MS. various concertos for the violoncello, the German flute, the hautbois, and the clarinet, which were sold singly in MS. at the music fairs in Leipzig and Hamburgh, all much admired when executed by great performers. Besides these, some MS. duets and solos for the violoncello were long purchased and performed with great applause.

**FILUM Aquos.** the thread or middle of the stem where a river parts two lordships. *Et habebant illas buttas, uque ad filum aquae predictum. Fili du mer, the high tide of the sea.* Rot. Parl. 11 Hen. IV.

**FILURIA.** in Geography, a town of European Turkey, in Macedonia; 28 miles N. of Edessa.

**FIMARELLA.** a river of Naples, which runs into the gulf of Tarento. N. lat. 39° 36'. E. long. 17° 12'.

**FIMBLE HEMP.** in Rural Economy, a term sometimes applied to early ripe hemp, or female hemp. See Female Hemp.

**FIMBRIA.** in Anatomy, the fringed border of the opening, by which the Fallopian tube communicates with the abdominal cavity. This part is named the frumented extremity of the tube. (See Generation.) There is also a part in the brain called corpus fimbriatum. See Brain.

**Fimbrria.** in Surgery, was a term anciently employed to signify the outer tape, or fillet, which was put on to secure the rest of some bandage, or apparatus.

**FIMBRITARIUM.** a term in Heraldry, signifying that an ordinary is edged round with another of a different colour.

Thus, he beareth, or, a cros-patte gules frumented fable.


Gen. Ch. Cal. a single scale to each flower, concave, keeled, gradually deciduous, making part of a spike imbricated every way. Cor. none. Stam. Filaments usually three, rarely only one or two; anthers linear. Pist. German very small, superior; style with a half-globular bulb at the base, which falls off along with it; compressed and gradually dilated upward, fringed or ciliated at each edge; stigmas two, capillary, spreading, downy. Peric. none. Seed one, oblong, convex at each side, pointed at the base, without any surrounding bristles. Receptacle gradually elongated and becoming naked from the base upward, very closely pitted, the pits or cells having each a membranous border.


This genus is separated from Scirpus by Vahl, in consideration of the great extent of the latter, which has long rendered some such division desirable. He defines its habit as follows.

Stems several, erect, without joints, leafy in the lower part. Leaves channelled, rough-edged upwards. Inflorescence like the leaves. Rays of the umbel bearing each one spike, and having a central fertile spike at their base; sometimes each ray bears two spikes, one of which is fertile, the other sterile; all the spikes are gradually elongated as the seeds ripen. Keel of the scales green.


**F. dactylosum.** Spikes ovato-oblong. Inflorescence of about three leaves, longer than the repeatedly compound umbel. (Scirpus dactylotum; Linn. Sp. Pl. 74. Wild. Sp. Pl. v. t. 303. Sm. Fl. Græc. Sibth. v. 1. t. 52. Rottb. Gram. 57. t. 13. f. 1) — Native of the East Indies and South of Europe, in moist sandy ground. Root annual, fibrous. Herbaceous, glaucous-green. Stems from six to twelve inches high. Spikes more ovate and acute, as well as larger, than in the former. Stammen from one to three. Rottboil describes the style as rough, but does not represent it so, neither is that character, which makes the plant a Filbrystylis, exhibited by Mr. Bauer in the Flora Graeca.

**F. ferrugineum.** Spikes ovato-oblong. Scales somewhat downy or hoary in the middle. Inflorescence of about two leaves, as long as the simple umbel. (Scirpus ferrugineus; Linn. Sp. Pl. 74. Gramen cyperoides majus, spicis ex oblongo rotundatis compactis ferrugineis; Sonne Jam. v. 1. t. 18. t. 77. f. 2.) — Native of falt marshes in Jamaica. Stems a foot and half high, glaucous, ribbed, compressed. Umbel simple or compound, of three to five rays. Spike half an inch long, brown and hoary. Vahl is much confused in his quotation of Sonne, as in many other similar cases, his book being carelessly executed in that respect. In this he differs from copying Linnæus without turning to the book quoted.

**F. lapidic.** Spikes oblong, cylindrical, acute. Inflorescence rigid, of two leaves, as long as the doubly compound umbel. (Scirpus lapidic; Linn. Sp. Pl. 74. Gramen cyperoides majus aquaticum, paniculit plurimis junceis fariis, spicis ex oblongo rotundatis fariis; Sonne Jam. 18. t. 76. f. 2) — Native of watery places in the West Indies. Stems two or three feet high, rigid and rough, Spikes numerous, acute, an inch long, dark shining brown. F. argentum. Spikes cylindrical, obtuse, fuscous, clustered, in round heads. — (Scirpus argentum; Rothb. Gram. 51. t. 17. f. 6. Mullen-pullu; Rheed. H. Mal. v. 12. t. 101. t. 54) — Native of moist places in the East Indies. Root apparently annual. Stems numerous, from three to fix inches high, glaucous as well as the leaves. Spikes of a silvery grey, numerous, in dense heads. Vahl thinks
FIN

**Scirpus menander** of Rottboll, 52 t. 14. f. 3, is not different from this. We believe this genus will receive augmentation from several species hitherto considered as **Scirpus**, but not yet described. As far as we have observed, the progressively caducous rachis of the spikes, from the deciduous glumes, is very characteristic of a *Finiferae*. **FIn**, in Geography, a small river of the county of Monaghan, Ireland, which rises in the west of the county, and runs into Lough Erne.

**Fin**, *Piana*, in *Natural History*, the name of that part of a fish which distinguishes it from other aquatic creatures, no animal but a fish having fins and wanting legs.

The fish is properly a part standing out or hanging from the body of the fish, and consisting of a membrane supported by several rays or oblong bones, which are in some hard and firm, and in others cartilaginous. This definition of a fin properly excludes all those other parts of a fish which may be prominent from the body, and may be of a membranaceous structure, and even bear the appearance of a fin, though they have none of the rays or little bones within them, and therefore cannot serve the creature in the office of fins in swimming; for the cartilages or bones which support the membranes of the fins are what give them their due and necessary strength and firmness to bear against the water for the motion of the body of the fish; those other membranaceous appendages to the bodies of fishes cannot do this; for wanting the support of these rays, the simple and soft membrane has no more power of moving the water than the water has of moving it. Hence appears the use of the bones or rays supporting the fins, and the truth of the definition, that nothing is properly a fin which wants them.

The fins, by their differences, make very obvious distinctions among the several species of fish; and these differences are in regard to number, situation, figure, and proportion.

The number of the fins, including the tail, is very different in different fish. 1. In some there is only one fin to the whole fish: this is the case in the opidium humbriciforme, and in the murex. 2. The fins are two in number in others, as in the petromyzze, and the like. 3. There are many which have three fins, as the conger, the cel, the common ophidium, the Greenland whale, the sea-cow, and the like. 4. Many have four fins; of the number of which are the dolphine, the phocaena, and the second kind of the acus Arilolitis. 5. Several have five fins, as the annodytes, or eaud-cul, the sword-fish, the lupus marinus, the mola or fandel-fish, and many others. 6. The lamp-fish gives us an instance of six fins; for the common lamp-fish on the back of that fish is not a real fin, but only a cutaneous prominence. 7. Many fish have seven fins, as the gudgeon, the pleuronectes, the cyprinids, the culvora, the coregonids, the ophidium, the salmon, the cobices, the eooches, the cernua fluviatiles, the garofolces, the pipri, the labri, the fihruses, the mugil alatus, the remora, the caphricus, the hippurus, the pomplius, and the accipenser. 8. Many fin also have eight fins each; of this number are some of the perches, the clarae, the costus, the mugil, the labius, the fideis, the milii, the ling, the trachurus, the brachyurus, the trachinius, the uricans, and that little fish called the anguella by the Venecians. 9. The sohrrna of Rondeletius gives us an instance of the fins being nine in number; and finally, the stovini and thymi give us instances of eleven fins in the same fish.

The differences in situation are less numerous than those as to number, but they are not less obvious and essential.
subject to the Ligurian republic. Its capital is a sea-port town of the same name, having a good harbour on the coast of the Mediterranean; 31 miles S.W. of Genoa. N. lat. 44° 10'. E. long. 5° 24'.

FINALE, Ital. in Music, the last chorus, or movement at the end of an act of an opera; and in symphonies, concertos, quartettes, or sonatas, the last movement is called the finale. The finales of the Italian comic operas are the most ingenuous, varied, pleasing, and malleable compositions which dramatic music can boast; particularly those of Paisiello, Pinelli, Cimarosa, and Mozart. Such a variety of mountains, such fires, grace, passion and pathos, by turns, that the hearer, at the end, is unable to tell what movement or passage he likes best. They are extremely difficult to perform, yet the Italians, by dint of study and reheasal, are no more embarrassed than if, instead of fingering, they were only talking and squabbling the whole time.

FINIS PAUSA, in old music, two Latin words. See CORONA.

FINANCES, in Political Economy, denote the revenues of the king and state; much the same with the scheme of the Romans. The word is derived from the German, finanzi, finanz, fusion, efpoping, usury; though Du-Cange chooses rather to deduce it from the barbarous Latin, finanzia, praefatio pecuniaria.

The French have a peculiar kind of figures or numeral characters, which they call chiffre de finance. See CHARACTER.

FINANCES, British. See Fund and Revenue.

FINBO, in Geography, a mountain of the Lower Engadine; 8 miles N. of Träup. FINBY, a town of Sweden, on an island in the government of Abo; 28 miles S.S.E. of Abo. N. lat. 60° 7'. E. long. 25° 41'.

FINCASTLE, a post-town of America, in Virginia, and capital of Botetourt county, situated on the E. side of Catawba creek, a small stream which falls into James river, on the W. side of the North mountain. It has about 35 houses, a court-house and gaol, and contains 426 free inhabitants, and 276 blacks. It lies on the post road from Richmond to Kentucky; 36 miles E. of Lexington.

FINCH, a township in the county of Stormont, in Upper Canada, W. of Osnabruck.

FINCH, in Ornithology. See FINCHILLA.

FINCH-backed, streaked on the back with white. It is molly used in respect to cattle.

FINCHED, in Rural Economy, a term which is often used to signify a streaked on the back or other parts with white spots or stripes.

FINCK, Herrman, published at Wittenberg, in 1556, "Practica Mathematica," in Latin, with examples of various characters, proportions, and canon, with opinions of the ecclesiastical modes or tones, and a more pleasing and artificial method of singing. This may have been a useful tract when published, but it is dry, and little is to be learnt in it now, of material use.

FINDE, in Optics, a short telescope, generally affixed to the tube of a large one, for the purpose of expeditiously finding out any object. This finder does not magnify the object more than four, six, or eight times; but it has a large field of view, so that a great part of the heavens may be seen through it at once. In the indusc of its tube, and exactly at the focus of the eyeglasses, there are two fnder wires, which cross each other in the axis of the telescope. The finder is adjusted by means of screws upon the tube of the large telescope, in such a manner, that, when an object, seen through the finder, appears to be near the crossing of the above-mentioned wires, it is at the same time visible through the large telescope; hence, when the observer wishes to view a small distant object, as a star, a planet, &c., he moves the instrument to one side or the other, until, by looking through the finder, he brings the object clearly to coincide with the crossing of the wires. And when that takes place, he immediately looks through the large telescope.

FINDE, in our Old Statutes, are supposed to be the fame with those we now call searthers, who are employed for the discovery of goods imported or exported without paying custom. Stat. 18 Edw. III. 14 Ric. II. 17 Ric. II. &c.

FINDE, among Sportsmen. See Water-Dog.

FINDBORN, in Geography, a fishing-town of Scotland, on the N. coast of the county of Murray, at the mouth of the river Findhorn, near the north of Murray, with a tolerable harbour, and a large convenient bay; 9 miles W. of Elgin. N. lat. 57° 11'. W. long. 3° 29'.

FINDEING OF a Bill of Indictment, in Law. See Indicement.

FINE, in Geometry, one of the most celebrated mathematician of his time, was a son of a physician at Brussels, where he was born in the year 1492. This father dying while he was very young, he went to Paris, and, through the intercession of Anthony Silvelier, obtained a place in the college of Navare, where he went through a course of classical learning and philosophy. His attention to polite literature did not prevent him from applying much of his attention to mathematics, which he found most congenial to his taste and inclination. In these sciences he had no infirnum, and the study of them had fallen into disrepute. Regardless of the prevailing fashion of the age, he determined to proceed, and by the force of his own genius, and a few demonstrations, he made considerable progress in them. In 1519, he published an edition of "John Martin Siliccius' Arithmetic;" and afterwards, in 1523, he gave to the public a revised and improved edition of the "Margauca Philosophica," containing the principles of rational and moral philosophy. After this, he was still a student at the college of Navare, he gave private lectures in the mathematics, and then became a public teacher of them in the college of Geriwb. In this capacity he obtained so high a reputation, that Francis I., who had founded a new college at Paris, and who was desirous of filling the profefforship with men of the fttll rate abilities, recommended Fine as the most proper person to teach the mathematics. This excellent mathematician, like many others who flourished at the same period, was devoted to the art of judicial astrology, and, on one occasion, he suffered a long and severe imprisonment, for presuming to announce predictions that seemed to affect the court of France. Fine was likewise a good mechanic, and invented and constructed different instruments and pieces of mechanism, which added very much to his celebrity as a man of science. Notwithstanding his genius, abidity, and extraordinary talents, and the skill in which he was held by an almost inextricable number of perfons, it was his hard lot never to receive an adequate reward for his great services. Through the whole of his life he had to struggle with the evils of poverty, to the disgrace of many who affected to value him very highly, and who could not but be well acquainted with his wants, but who nevertheless had not the spirit nor the virtue to afford him any assistance. He died in the utmost distress in 1555, leaving behind him a wife and six children, involved with debt, and destitute of all means of support. Provision was, however, made for their decent maintenance, by those who had pretended...
tended to patronize him while living. The works of Fine were published together in three volumes folio, which bear the dates 1532, 1545, and 1546. Bayle, Mass. 214.

Fines, that which is pure, and without mixture. The term is particularly used in speaking of gold or silver. See Gold and Silver.

Fine, finis, or finalis concordia, in Law, denotes a solemn amicable agreement or composition of a suit (whether that suit be real or fictitious) made between the demandant and tenant, with the consent of the judges; and enrolled among the records of the court where the suit was commenced; by which agreement freehold property may be transferred, settled, and limited. (Crane on Fines.) Sometimes, says Shepherd (Touchft. c. 3.) it is taken for "a final agreement or conveyance upon record for the settling and securing of lands and tenements;" and accordingly it is designated by some to be an acknowledgment, in the king's court, of the land or other things to be his right that heщин complain;" and by others a covenant made between parties, and recorded by the judges; and by others a friendly, real, and final agreement amongst parties, concerning any land, rent, or other thing; whereby any suit or wrong is hanging between the said parties, and whereof the more fully or less is the agreement of record of an agreement concerning lands, tenements, or hereditaments duly made by the king's licence, and acknowledged by the parts to the same, upon a writ of covenant, writ of right, or such like, before the judges of the Common Pleas, or others thereunto authorized, and enrolled of record in the same court: to end all controversies thereof, both between themselves, which be parties and privy to the same, and all strangers not suing or claiming in due time."

A fine is sometimes said to be a feoffment of record (Co. Litt. 50a); though it might be more accurately called an acknowledgment of a feoffment on record; by which is to be understood, that it has at least the same force and effect with a feoffment, in the conveying and affuring of lands; though it is one of those methods of transferring estates of freehold by the common law, in whichIVERY OF FEIN is not necessary to be actually given; the supposition and acknowledgment thereof in a court of record, however fictitious, indubitably serves the same purpose. But more particularly, a fine may be described to be a valuable consideration for the grant of a suit, either actual or fictitious, by leave of the king or his judges; whereby the lands in question become, or are acknowledged to be, the right of one of the parties. (Co. Litt. 120a.) In its original it was founded on an actual suit, commenced at law for recovery of the possession of land or other hereditaments; and the poiffession thus gained by such composition was to be so sure and so effectual, that fictitious actions were, and continue to be, every day commenced, for the sake of obtaining the same security. A fine is to be called because it puts an end, finis, not only to the suit thus commenced, but also to all other suits and controversies concerning the same matter. Accordingly it is so expressed in an ancient record of parliament, 18 Edw. I. Fines, indeed, are of equal antiquity with the first rudiments of the law itself: they are spoken of by Glaseid and Bracton in the reigns of Henry II. and Henry III., as things then well known and long established; and instances of them have been produced even prior to the Norman invasion. (Burn. on Convey.) So that the statute of 18 Edw. I. (2 Stat. 9 Eliz. c. 1., called "Modus lendani fines," did not give them original, but only declared and regulated the manner in which they should be levied, or carried on. This is as follows:

1. The party, to whom the land is to be conveyed or affurred, commission an act or suit at law, against the other, generally an act of covenant, by suing out a writ or "practise," called a writ of covenant; the foundation of which is a supposition agreement or covenant, that the one shall convey the lands to the other; and the breach of which agreement the action is brought. On this writ there is due to the king, by ancient prerogative, a "primer fine," or a noble fee for every five marks of land sued for; that is, one tenth of the annual value. (2 Inst. 511.) The fine being thus commenced, there follows

2. The "licentia concordandi," or leave to agree the suit. For, as soon as the action is brought, the defendant, knowing himself to be in the wrong, is supposed to make overtures of peace and accommodation to the plaintiff; who accepting them, but having, upon making out the writ, given pledges to prosecute his suit, which he endangers, if he now defects it without licence, he applies to the court for leave to make up the matter. This leave is readily granted; but for it there is also another fine due to the king, by his prerogative, which is an ancient revenue of the crown, and is called the "king's finis," or sometimes the "poll-tax," with respect to the "primer fine," before-mentioned. And that is, as much as the "primer fine," and half as much more, or 10 shillings, or exactly 5 marks for every mark of land; that is, three twentieths of the supposed annual value. (5 Rep. 39. 2 Inst. 511. Stat. 52 Geo. II. c. 14.)

3. Next comes the "concord," or agreement itself; after leave obtained from the court; which is usually an acknowledgment from the defendant (or those who keep the other out of possession,) that the lands in question are the right of the complainant. And from this acknowledgment, or recognition of right, the party leyving the fine is called the "cognizer," and he to whom it is levied the "cognizee." This acknowledgment must be made either openly in the court of Common Pleas, or before the chief judge of the court; as also before one of the judges of that court, or two or more commissioners in the county, empowered by a special authority called a writ of "decimus potestats," by which judges and commissioners are bound by statute 18 Edw. I. 4. to take care that the cognizer be of full age, found memory, and out of prison. If there be any feme-covert among the cognizors, he is privately examined whether he does it willingly and freely, or by compulsion of another husband or wife.

By these acts all the essential parts of a fine are complete; and if the cognizer dies the next moment after the fine is acknowledged, provided it be subsequent to the day on which the writ is made returnable (Comb. 71.) still the fine shall be carried on in all its remaining parts; of which the next is

4. The "note" of the fine; which is only an abridgment of the writ of covenant and the concord; naming the parties, the parcel of land, and the agreement. This must be enrolled of record in the proper office, by direction of the statute 5 Hen. IV. c. 14.

5. The fifth part is the "fact" of the fine, or conclusion of it; which includes the whole matter, treating the parties, day, year, and place, and before whom it was acknowledged or levied. Of this there are accessories made, or affected, at the chirurgist's office, and duly red to the cognizer and the cognizee; firstly beginning thus, "we acknowledgment concords," on this is the final agreement, and the reciting the whole proceeding at least. That the fine is completely levied at Common Pleas: By several statutes some additional solemnities are introduced, in order to render the fine more inviolably public, and less liable to be void by fraud or corvin. And lastly, by 27 Edw. I. c. 4, the amount of the fine shall be openly read in the court of Cogni.
Plea, at two several days in one week, and during such reading all pleas shall cease. By 5 Hen. IV. c. 14, and 23 Eliz. c. 7, all the proceedings on fines, either at the time of acknowledgment, or previous, or subsequent thereto, shall be enrolled in record in the court of Common Pleas. By 1 Ric. III. c. 7, confirmed and enforced by 4 Hen. VII. c. 24, the fine, after engrossment, shall be openly read and proclaimed in court (during which all pleas shall cease) sixteen times, viz. four times in the term in which it is made, and four times in each of the three succeeding terms, which is reduced to once in each term by 31 Eliz. c. 7, and the elocations are endorsed on the back of the record. It is also enacted by 23 Eliz. c. 3, that the choreographer of fines shall every term write out a table of the fines levied in each county in that term, and shall affix them in some open part of the court of Common Pleas all the next term, and shall also deliver the contents of such table to the sheriff of every county, who shall at the next adjourn fix the same in some open place in the court, for the more public reading of the fine.

Fines, thus levied, are of four kinds: 1. What is in our law French called a fine "fur cognizance de droit, come ceo quilad de fon done," or a time upon acknowledgment of the right of the cognizor, as that which he hath of the gift of the cognizor. This is the best and surest kind of fine; for thereby the defendant, in order to keep his covenant with the plaintiff, of conveying to him the lands in question, and at the same time to avoid the formality of an actual feoffment and livery, acknowledges in court a former feoffment, or gift in possession, to have been made by him to the plaintiff. This fine is therefore said to be a feoffment of record; the livery thus acknowledged in court being equivalent to an actual livery; so that this assurance is rather a confession of a former conveyance than a conveyance now originally made; for the defendant, or cognizor, acknowledges, "cognizor," the right to be in the plaintiff, or cognizor, as that which he hath "de fon done," of the proper gift of himself, the cognizor. 2. A fine "fur cognizance de droit tantum," or upon acknowledgment of the right merely, not with the circumstances of a preceding gift from the cognizor. This is commonly used to pass a reserfatory interregnum, which is in the cognizor. For of such reversions there can be no feoffment, or donation with livery, soppofed; as the possession during the particular estate belongs to a third person. (Moor. 629.) It is thus worded: "that the cognizor acknowledges the right to be in the cognizor; and grants for himself and his heirs, that the reversion, after the particular estate determines, shall go to the cognizor." (Well. Symb. p. 2. § 95.) 3. A fine "fur cognizor," is, where the cognizor, in order to make an end of disputes, though he acknowledges no precedent right, yet grants to the cognizor an estate "de novo," usually for life or years, by way of safeguarded composition. And this may be done referring a rent, or the like; for it operates as a new grant. (Well. p. 2. § 66.) 4. A fine "fur done, grant, et render," is a double fine, comprehending the fine "fur cognizance de droit come ceo, &c." and the fine "fur cognizor," and may be used to create particular limitations of estate; whereas the fine "fur cognizance de droit, &c." conveys nothing but an absolute estate, either by inheritance, or at least of freehold. (Salk. 342.) In this last species of fine, the cognizor, after the right is acknowledged to be in him, grants back again, or renders to the cognizor, or perhaps to a stranger, some other estate in the premises. But, in general, the first species of fine, "fur cognizance de droit, come, &c." is the most used, as it conveys a clear and absolute freehold, and gives the cognizor a

FINE.

The force and effect of a fine principally depend, at this day, on the common law; and the two statutes, 4 Hen. VII. c. 23, and 32 Hen. VIII. c. 56. The ancient common law, with respect to this point, is very forcibly declared by the statute 18 Edw. I.; which states that the fine is to be high a bar, and of such force, that it precludes not only those who are parties and privies to the fine, and their heirs, but all other persons in the world, who are of full age, out of privity, of found memory, and within the four years, the day of the fine levied; unless they put in their claim on the foot of the fine within a year and a day. But this statute, after the fine has been levied, becomes a bar to the parties, &c., and, in its nature, judge of their title. This doctrine of barring the right by "non-claim," was abolished for a time by the statute made in 34 Edw. III. c. 15, which admitted persons to claim, and lapse a fine, at any time until the death of the finee, and whereby, as Sir Edward Coke observes, (2 Inst. 518.) great contention arose, and few men were sure of their possessions, till the parliament, held 4 Hen. VII. reformed that mischief, and excellently moderated between the latitude given by the statute and the rigour of the common law. By that statute the right of all strangers whatsoever is bound, unless they make claim, by way of action or lawful entry, not within one year and a day, as by the common law, but within five years after proclamations made: except fine-covers, infants, prisoners, persons beyond the sea, and such as are not of able mind; who have five years allowed to them and their heirs, after the death of their husbands, their attaining full age, recovering their liberty, returning into England, or being restored to their right mind. Henry VII. seems by this statute to have covertly extended fines so as to have been a bar of estates-tail, in order to render them more open to alienations; but doubts having arisen whether they could, by mere implication, be adjudged a sufficient bar (which are expressly declared not to be by the statute "de donis"), the statute 32 Hen. VIII. c. 56, was the statute made, which declares that a fine levied by any person of full age, to whom or to whose ancestors lands have been entailed, shall be a perpetual bar to them and their heirs, claiming by force of such entail; unless the fine be levied by a woman after the death of her husband, or lands which were, by the gift of him or his ancestor, assigned in tail to her for her jointure (stat. 11 Hen. VII. c. 2); or unless it be of lands entailed by act of parliament or letters patent, and whereof the reversion belongs to the crown.

From the view now given of the common law, regulated by these statutes, it appears that a fine is a solemn conveyance on record from the cognizor to the cognizee; and that the persons bound by a fine are parties, privies, and strangers. The parties are either the cognizors of cognizees; and these are immediately concluded by the fine, and barred of any latent right they might have, though under the legal impediment of coverture. And, indeed, as this is almost the only act that a free-coveet or married woman is permitted by law to do, (and that because she is privately examined as to her voluntary consent, which removes the general infinque of coverture or coverture,) it is therefore the usual and almost the only safe method whereby the can join in the sale, settlement, or incumbrance of any estate. Privies to a fine are such as are any way related to the parties who levy the fine, and claim under them by any right of blood, or other right of representation. Such as are the heirs-general of the cognizor, the issue in tail since the statute of Henry VIII., the vender, the devisee, and all others who must make title by the persons who
who levied the fine. For the act of the ancestor shall bind the heir, and the act of the principal his substitute, or such as claim under any conveyance made by him subsequent to the fine so levied. (3 Rep. 87.) Strangers to a fine are all other persons, except parties and privies. These are also bound by a fine, unless, within five years after proclamation made, they interpose their claim, provided they are under no legal impediment, and have then a present interest in the estate. The impediments, as we have already mentioned, are coverture, infancy, imprisonment, insanity, and absence beyond sea; and persons, who are thus incapacitated to prosecute their rights, have five years allowed them to put in their claims after such impediments are removed.

Persons also that have not a present, but a future interest only, as those in remainder or reversion, have five years allowed them to claim in, from the time that such right accrues. (Co. Litt. 377.) And if within that time they neglect to claim, or (by the statute 4 Ann. c. 16) if they do not bring an action to try the right within one year after making such claim, and prosecute the same with effect, all persons whatsoever are barred of whatever right they may have, by force of the statute of non-claim. But, in order to make a fine of any avail at all, it is necessary that the parties should have some interest or estate in the lands to be affected by it. Else it were possible that two strangers, by a mere confederacy, might without any risk defraud the owners by levying fines of their lands; for if the attempt be discovered, they can be no sufferers, but might only remain in statu quo; whereas, if a tenant for life levies a fine, it is an absolute forfeiture of his estate to the remainder-man or reversioner. (Co. Litt. 521.) if claimed in proper time.

It is not therefore to be supposed that such tenants will frequently run to great a hazard; but if they do, and the claim is not duly made within five years after their respective terms expire (2 Lev. 52.), the estate is for ever barred by it. Yet where a stranger, whose presumption cannot be thus punished, officiously interferes in an estate in which no wife belongs to him, his fine is of no effect; and may at any time be set aside (unless by such as are parties or privies thereunto) (Hub. 334.) by pleading that "partes habuerunt." And even if a tenant for years, who hath only a chattel interest, and no freehold in the land, levies a fine, it operates nothing, but is liable to be defeated by the fame plea. (5 Rep. 123 Hardr. 401.) Wherefore, when a lease for years is diposed to levy a fine, it is usual for him to make a feoffment first, to displace the estate of the lessor (Hardr. 402. 2 Lev. 52.), and create a new freehold by dilisit. Blackl. Com. Bk ii. See Recovery.

In order to punish criminally such as thus put the estate of another to the hazard as far as in them lies, the statute 21 Jac. 1. c. 26 makes it felony without benefit of clergy to acknowledge, or procure to be acknowledged, any fine, recovery, or judgment, &c. in the name of any person not privy or confenting to the same.

Fines may be recovered for error, so as the writ of error be brought in 20 years, &c. and not afterwards by Stat. 12 & 13 W. III. c. 11, which 20 years are to be computed from the time of the fine levied, and not from the time the title accrued (2 Stra. 1257.) No person can bring a writ of error, to reverse a fine, or any judgment, that is not intituled to the land, of which the fine was levied. In order to avoid a fine there must be an actual entry, except where the time is levied without proclamation; for the statute 4 H. VII. c. 24. does not extend to such a fine, and it may be avoided at any time within 20 years. (2 Will. 45.) The entry, when necessary, must be made by the person who has a right to the lands, or by some one appointed by him. (1 Stat. 258 a.) Nothing can be agitated for error that contradicts the record. (1 Rol. Abr. 755.) Fines are not verifiable for fraud, intermission, misprision, or any want of form, but it is otherwise if of substance. (Stat. 23 Eliz. c. 3.) Fines may be avoided, where they are obtained by fraud, covin, or deceit, though there be no error in the process. (Cro. Eliz. 471.)

Fines are generally divided into those with, and those without proclamations; the former is termed a fine according to the statutes 1 R. III. c. 7. 4 H. VII. c. 24.; and the latter is called a fine of the common law, being levied in such manner as was used before the statute 4 H. VII. c. 24.; and is still of the like force by the common law, to discontinue the estate of the cognizor, if the fine be executed.

Fines are either single or double. Single fine is that by which nothing is granted or rendered back again by the cognizors to the cognizor, or any of them. Double fine contains a grant and render-back, either of some rent, common, or other thing out of the land, or of the land itself, to all or some of the recognizors for some estate, limiting thereby remainders to strangers not named in the writ of convenant.

In this kind of fine, called "fur done, grant and render," both the fines "fur cognizance, &c. and "fur consequit," are formed into one; and it is partly executed and partly executory. See Fine above.

Sometimes also a double fine is when the lands lie in several counties.

Fines, with regard to their effect, are divided into executed and executory. Fine executed, is such as of its own force gives a present possession (at least in law) to a cognizor; so that he needs no writ of "habere facias finis," for execution of the same: of which sort is a fine "fur cognizance de droit come eco, &c." that is, upon acknowledgment, that the thing mentioned in the concord is "jus ipius cognisati, ut illa quo idem habet de dono cognitirius." Well. § 51. K.

The reason is, because the fine paffeth by way of release of a thing which the cognizor hath already (at least by supposition) by virtue of a former gift to the cognizor, which is, in truth, the finest fine of all. See Fine, supra.

Fines executory, are such as of their own force do not execute or give the possession to the cognizor without entry or action, but require a writ of "habere facias finis," as a fine "fur cognizance de droit tantum," unless the party be in possession of the lands. This kind of fine is commonly made use of to pass a reversion. There is also another executory fine called "fur consequit." See Fine, supra.

Fines in England are now levied in the court of Common Pleas at Westminster, in regard to the solemnity thereof, ordained by the statute of 18 Ed. I. Stat. 4. before which time they were sometimes levied in the county-court, court-bartons, and in the exchequer, as may be seen in Origins Judiciales, &c.

Fines are also taken by commissioners in the country, empowered by decimus parliamentum, 15 Ed. II. Stat. 2 fine. Though by the common law all fines were levied in the court. Fines levied before the justices in Wales, or in the counties palatine of Chester, Durham, &c. have the same effect as those that are levied before the justices of C. B.

Fine adullando brevitu de tenemento quod fuit de ejbimo domino, a writ directed to the justices of C. B. for dissolving a fine levied of lands in ancient demesne to the prejudice of the leed. Reg. Orig. 15.
Fine for alienation, are fines formerly paid to the king by his tenants in chief, for licence to alienate their lands, according to the statute 1 Edw. III. c. 12, but taken away by statute 12 Car. II. cap. 25.

Fine capitules postumos, &c., a writ lying where a person upon conviction of any offence by jury hath his lands and goods taken into the king’s hands, and his body is committed to prison; to be remitted his imprisonment, and have his lands and goods restored to him on obtaining favour for a sum of money. Reg. Orig. 142.

Fine pro divisione effluxionis in fort. 33 H. VIII. cap. 12, denoting that a person is forced to do that which he can in no way avoid.

Fine levado de tementibus de reg. in capite, &c., a writ directed to the juries of the Common Pleas to admit of a fine for the title of land holden of the king in capite. Reg. Orig. 167.

Fine non capitulos pro falsiure placitandi, a writ to inhibit officers of courts to take fines for fair pleading. Reg. Orig. 170.

Fine pro rediffinse capitanda, &c., a writ laying for the release of one imprisoned for a reddifying, on payment of a reasonable fine. Reg. Orig. 222.

Fines are all fines to the king. Under this head are included fines for original writs. Thus, for every writ of plea of land, if it be not of right patent, which is for the yearly value of five marks, and for all original writs in debt and trespass, where the debt or damage is 40s., a fine is due to the king of 6s. 8d. and more proportionably when the writ is for greater value.

In fine, according to Coke, signifies a sum of money paid as an income for lands or tenements let by lease, usually called per ignem.

In fine is also used to denote an amends, pecuniary punishment, or recompense, for an offence committed against the king and his laws, or against the lord of a manor. In which case a man is said, jussere fines de transferre causam regni, &c.

In all the diversities of the use of the word fine, it hath but one signification; and that is, a final conclusion, or end of differences between parties. In the last sense, where it denotes the ending and remission of an offence, it is used by Bracton, who speaks of a common fine that the country pays to the king for false judgments or other trespasses, which is to be allowed by the justices in eyre before their departure, by the oaths of knights and other good men, upon such as ought to pay it. There is also a common fine in courts leet.

The discretionary fines (and discretionary length of imprisonment) which our courts are enabled to impose, may seem an exception to the general rule, that the punishment of every offence is ascertained by the law. But the general nature of the punishment, viz., by fine or imprisonment, is fixed and determinate; though the duration and quantity of each may frequently vary, from the aggravations, or alleviations, of the offence, the quality and condition of the parties, and innumerable other circumstances. The quantum, in particular, of pecuniary fines neither can, nor ought to be, ascertained by any invariable law. The value of money is fluctuating; and what would be ruin to one man’s fortune may be matter of indifference to another. Thus the law of the twelve tables at Rome fined every person, that struck another, twenty-five denarii; and this, in the more opulent days of the empire, became a punishment of so little consideration, that Aulus Gellius tells a story of one Lucius Neratus, who diverted himself by giving a blow to any person at pleasure, and then tendering the legal forfeiture. Our statute law has not therefore often ascertained the quantity of fines, nor the common law ever; merely directing such an offence to be punished by fine in general, without specifying the certain sum: and this will appear to be fully sufficient, when we consider that, however unlimited the power of the court may seem, it is far from being wholly arbitrary: but its discretion is regulated by law. For the bill of rights (lat. 1 W. and M. d. 2. c. 2) has particularly declared, that executive fines ought not to be imposed, nor cruel and unusual punishments inflicted (which had a retrospect to some unprecedented proceedings in the court of king’s bench, in the reign of king James II.), and the same statute further declares, that all grants and promises of fines and forfeitures of particular persons before conviction, are illegal and void. Now the bill of rights was only declaratory of the old constitutional law; and accordingly we find it expressly holden, long before (21 Hals. 48.) that all such previous grants are void; since thereby many times undue means, and mere violent proceedings, was used for public lucres, not the quiet and just proceeding of the law would permit.

The reasoonableness of fines in criminal cases has also been usually regulated by the determination of “Magna Charta” (c. 14.) concerning amercements for misbehaviour by the factors in matters of civil right. See AMERCEMENT.

Counts of record may fine for an offence committed in court in their view, or by confession of the party recorded in court. (1 Lill. Abr. 621.) A man shall be fined and imprisoned for all contempt done to any court of record, against the commandment of the king’s writ, &c. (9 Rep. 60.) See CONTEMPT. Some courts may impose, and not fine, as the constables at the petit feiions; some courts cannot fine, or imprison, but amerce, as the county, hundred, &c.; but some courts cannot fine, imprison, nor amerce, as ecclesiastical courts hold before the ordinary, archdeacon, &c., or their commissaries, and such who proceed according to the canon, or civil law. (11 Co. 43. 44.)

A fine may be mitigated the same term it was set, being under the power of the court during that time, but not afterwards. (T. Raym. 376.) And fines assessed in court by judgment upon an information, cannot be afterwards mitigated. (Cro. Car. 221.) If a fine certain is imposed by statute upon any conviction, the court cannot mitigate it; but if the party comes in before conviction, and submits to the court, they may assize a less fine; for he is not convicted, and perhaps never might. The court of exchequer may mitigate a fine certain, because it is a court of equity, and they have a privy-seal for it. (3 Salk. 33.) If an excessive fine is imposed at the feiions, it may be mitigated at the king’s bench. (1 Vent. 336.)

All fines belong to the king, because the courts of justice are supported at his charge: and wherever the law puts the king to any charge for the support and protection of his people, it provides money for that purpose. (Brach. 129.)

Fine-drawing, or rentering, a very nice way of sewing up or rejoining the parts of any cloth, stuff, or the like, torn or rent in the dressing, weaving, &c.

It is prohibited to fine-draw pieces of foreign manufacture upon those of our own, as has formerly been practised. See RENTERING.

Fine Loch, in Geography, is one of the extensive inland waters of Argyllshire, in Scotland, connecting with the sea by means of the cffuary of the Clyde rivers, and by Kylbrannan found on the west of the isle of Arran: it has also another communication with Clyde river by means of the Kyles of Bute on the west of Bute island. The principal branch of Fine Loch extends a few miles to the N.E. of the town of Inverary; from the top of Gilp Loch, which is a branch of this
this loch, the Crianan canal proceeds, for the passage of ships to the west into Crianan Loch, and the found of Jura. From Ealb Tarbeth Loch, another short branch of Fine Loch, the Tarbeth canal was, in 1773, proposed by Mr. Watt to form another communication with the found of Jura, by means of Well Tarbeth Loch. See Canal.

Fine-stilling, in the Diffillery; that branch of the art which is employed on the distilling the spirit from treacle or other preparations or remnants of sugar, is called fine-
stilling, by way of distinction from malt-stilling; and the person who exercises this part of the trade is called a fine-
diller.

The operation in procuring the spirit from sugar is the same with that used in making the malt spirit; a wash of the faccharine matter being made with water from treacle, &c. and fermented with yeast. It is usual to add in this case, however, a considerable portion of malt, and sometimes powdered jalap, to the fermenting backs. The malt accelerates the fermentation, and makes the spirit come out the cheaper, and the jalap prevents the rise of any muddy head on the surface of the fermenting liquor, so as to leave a greater opportunity for the free escape of the air, and thus to shorten the work, by turning the foamy into a hilling fermentation. Shaw's Lect. p. 122.

FINESSCHILARO, in Geography, a small island in the Mediterranean, near the N.E. coast of the island of Corfu; 7 miles N. of Bafia. N. lat. 42° 58'. E. long. 9° 39'.

FINEERING. See Veneering.

FINERS of Gold and Silver, are those who purify and part those metals from other coarser ones by fire and acids.

They are also called parters, in our old law-books, and sometimes departers.

FINEKY, in the Iron-works, is one of the two forges at which they hammer the low or pig iron. See Forge.

Into the finery they flirll put the pigs of iron, placing three or four of them together behind the fire, with a little of one end thrust into it; where, softening by degrees, they flir and work them with long bars of iron, and expulse at different times different parts to the blast of the bellows, in order to refine it as equally as possible, till the metal runs together with a round mafs or lump, which they call a cake or bloom. They then take this out, and give it a few strokes with their fedges; afterwards they carry it to a great heavy hammer, raised by the motion of a water-wheel; when, applying it dexterously to the blows, they presently bent it out into a thick short square. This they put into the finery again, and, heating it red-hot, they work it out under the fame hammer till it comes to be in the shape of a bar in the middle, but with two square nobs at the ends, which they call an anody. It is then carried into the other forge, called the chafery. Phil. Trans. No. 137, or Abr. vol. ii. p. 559. See Iron.

FINESS, a French term, of late current in English. Literally, it is of no farther import than our English fines or; but among us it is chiefly used to denote that peculiar delicacy or subtility, perceived in works of the mind, and the neatness and most secret and sublime parts of any science or art.

It is sometines used to express that kind of subtilty made use of for the purposes of deception.

FINAH In Ornithology. See LAMNIS Carulefons.

FINAGL, in Biography, the distinguished hero whose exploits and character are so charmingly portrayed in the fascinating poems of Oliffan, who, notwithstanding what has been advanced against their existence in the Gaelic language, from which they were professedly translated; was a real perfonage, a famous warrior, and renowned prince. The controversy respecting the genuineness of the originals was at one time as long and as ably defended by the partizans on each side the question, as that on the subject respecting the authenticity of the Idylls of Pindar by the critics of the day, under those able leaders in controversy, Barlow and Bentley. What was the family name of this supposed fictitious hero of romance, but really the gallant defender of his country from Roman subjugation, does not appear on the face of history; in that early period it not unfrequently happened, the real name was sunk in the official designation, or honolral title. He was the son of Comhail, the grandson of Truthail, and the great grandson of Trenmor, all Caledonian princes of great military reputation, during the severe struggles the Celtic tribes held with the invaders of Britain. He was king of Morven, a country to the north of the river Tay, supposed by some to have had for its southern boundary the Caledonian forest; and by others to have extended farther southward, into part of the Roman province of Valencia: it doubtful, from the bell authorities, comprised the whole of the northern and western Highlands, inclusive of the Hebrides or Western isles. His principal residence was at Selma, in the vicinity of Glenelg, county of Moray, supposed to be the Cona celebrated by Oliffan. According to the Irish annals, he was born A.D. 282; but the poems of Oliffan fix the date of his birth a few years later. The time of his death is uncertain.

After the Romans had overrun the country of the Picts, and given to that part of the soil to the north of their province, Valencia, the name of Caledonia, as the country next to be subdued, and penetrated part of the Highlands with an army under Lollius; they were repulsed and beaten back behind the frontier wall, erected at the command of Severus, by the Scottish provincials and the force of the troops under Com-
hal. On this occasion, the exploits performed by the son of that prince evidently he was equally qualified by talents, as deficient, to be the antagonist of a Roman emperor, and the hero of Oliffan; when Severus determined to conduct the war in person through North Britain, to wipe off the dis-
grace of his defeated legions under Lollius, and revenge the severities inflicted on his troops by the enraged natives; he called the two waits for those purposes, with the collected force of the empire in Britain; and entered with a spirit of vengeance, and reiterated messages of extirpation, the dist-
trict of Caledonia. At that period, the prince denominated Fingal was the head of the united British forces in the north, the Vind-gait of the combined army, a nation or office similar to that of the Pendragon among the western Britons; which has likewise been confounded with the family names, and considered a personal appellation. The haughty and enraged emperor was met by the undaunted Fingal, whose troops, well acquainted with the defiles and passes of the country, hung upon the invader's rear, har-
railed the imperial army in its march, selected advantageous ground, and made at every turn vigorous attacks, and frequent-
ly drew the enemy into invidious and fatal ambuscades. Thus wearied and reduced by the superior manoeuvring of their bold and vigilant opponents, the Romans experienced the greatest distress, so as to be obliged to destroy their sick and wounded, lest they should fall alive into the hands of whom they considered a barbarous enemy. In this expedition alone, according to Ammianus Marcellinus, they lost 15,000 men, and were constrained to cede to the victors that part of the country conquered by Lollius. And when the Romans, after being reinforced, again entered the country under the command
command of Caracalla, who was commissioned to exterminate the natives, Fingal met the Roman general in that part, now the county of Stirling, the latter was defeated on the banks of the Carron, the contested dominions given up, and the Romans again obliged to retire to the south of the wall. Exclusive of these contests, in which, through a protracted warfare, he displayed a superior prowess, and undaunted intrepidity, he appears to have conducted also naval wars. He is stated to have made frequent voyages to Scandinavia, the Orkneys, and Ireland, designated by Olfan, as Locklin, Ineffucre, and Ulfin.

"The character of Fingal," Dr. Blair observes, "is perhaps the most perfect that was ever drawn by a poet, for we boldly defy all the writers of antiquity to throw us any hero equal to Fingal. Throughout the whole of Olfan’s works, he is presented to us in all that variety of lights which give the full display of a character. In him concur almost all the qualities that can enoble human nature, that can make us admire the hero, or love the man. He is not only unconquerable in war, but he maketh his people happy by his wisdom in the days of peace. He is truly the father of his people. Wmtaker’s History of Manchethcir. Olfan’s Poems, with notes, &c.

FINGAMO, in Geography, a town of Japan, on the island of Nikhoon; 45 miles N. of Menczo.

FINGERS, in Anatomy, the last divisions of the upper extremity. For their names, see Digitus. The bones and joints of the fingers are described in the article Extremities. The structure of these organs, consisting of three bones moveable on each other, renders them particularly well suited for grasping, seizing, and holding external objects; for all those offices which come under the common name of prehension. By this arrangement any object of moderate size can be encircled by the fingers. The size of the bones, the firmness of the joints, and the strength of the muscles, below on them great powers in addition to their flexibility. The integuments at their extremities are highly organized, and receive a large supply of vessels and nerves, so as to constitute them the organs of touch, and the faculty with which they can be applied to any body, of which we are desirous to learn the properties, makes them a very convenient situation for that organ.

FINGERS, Amputation of. See Amputation.

Fingers, Carious. In these cases the surgeon is to endeavour to extract the exfoliating portions of bone immediately when they become loose. For this purpose, he is justified in making such incisions as may enable him to fulfil the object in view. Until the process of exfoliation is sufficiently advanced, he can do little more than apply simple dressings, and keep the part in a clean, quiet state.

When the separation of the dead pieces of bone will certainly destroy the utility of the finger, and convert the part into an inconvenient, stiff appendage to the hand; or, when the patient’s health is severely impaired by the irritation of the diseased, the termination of which cannot be expected within a moderate space of time; amputation is proper. It is a truth, however, that many fingers are amputated which might be preserved, and surgeons ought to consider well, before premeditating to remove parts which, when curable, may become of the greatest consequence, in regard to the perfection of the hand. The bread of many persons, it is well known, depends on the unmitigated state of certain fingers. These remarks are offered, because we have seen several surgeons, who are fond of seizing every opportunity of cutting their fellow-creatures, remove fingers, which might have been usefully saved, either by allotting a little more time to the exfoliation, or by making incisions, and cutting out the dead piece of bone.

Fingers, Dislocations of. See Luxation.

Fingers, Fractures of. See Fracture.

Fingers, Supernumerary. Children are sometimes born with more fingers than are natural, and since allowing the redundant number to remain would keep up deformity and create future inconvenience, the surgeon is called upon to amputate them. The redundant fingers are sometimes with, sometimes without, a nail. If added more numerous than one on each hand, are generally situated just on the outside of the little fingers, and, as far as our observation extends, are incapable of motion, in consequence of not being furnished, like the rest of the fingers, with muscles. The best plan is to cut off supernumerary fingers with a scalpel, at the place where they are united to the other part of the hand. The operation should be performed while the patient is in the infant state, that is to say, before the superfluous parts have acquired much size, and while the object can be accomplished with little pain. The incisions ought to be made so as to form a wound with edges, which can be brought into contact with strips of adhesive plaster. The hemorrhage will almost always cease, as soon as the dressings are applied, without any ligature.

Finger, Godfrey, in Biography, who resided many years in England during the latter end of the 17th century, and the beginning of the 18th, was a good performer on the violin, and a voluminous composer for that instrument, and when he quitted England and returned to Germany, was, according to Telemann in Mattheson’s Ehrenpforte, chamber musician to Sophia Charlotte, queen of Prussia, in 1702, and in 1717 chapel master to the court of Gotha. Finger was not a man of genius; but in science he was infinitely superior to the musicians with whom he had to contend.

Finger’s Breadth, a measure of two barley-corns in length, or four laid side by side.

Finger-keys, in Musik, or clavier of the Germans, signify the arrangement of short levers of different colours, on which the fingers act in performing on organs, piano-fortes, and some other instruments with fixed tones; the arrangement of these within one octave, from C to C, is shown in Musik, Plate I.; the learning and recollection of which will be much facilitated, by considering the same divided (between E and F) into two parts, which Dr. Callcott, in his "Plain Statement of Earl Stanhope’s Temperament," calls a ditone and a tritone, see those articles. It may be proper here just to add, that D is always the middle of the ditone in first division, and that G and A are the middle notes of the tritone or second division of the figaro, or whole octave. In Mr. Hawke’s patent piano-fortos and organs, with 17 flirings or pipes in each octave (fold by Mr. Bill, Rathbone Place, and Mr. Elliot, Tottenham Court), the whole clavier or range of finger-keys is shifted, by pedials, for occasioning either the five flat or the five sharp notes of each octave to be brought into play, as may be desired; without altering the pitch of the long keys or natural notes. See Temperament for an account of this, and various other systems of musical intervals.

Finger-key Intervals, is a term sometimes used for the half-notes, or semi-tones, between the 13 finger-keys of instruments; these, according to the common theory and notation used by all composers and copyists of music, are equal among themselves, and conform to the equal temperament of the scale, see that article, and Philosophical Magazine, vol. xxvii. p. 195; but, in Æthiopia, these finger-key intervals, both the simple ones between the next adjoining as well
FINGER.

well as between the more distant finger-keys, differ very sensibly from each other, in most of the other different syllables of temperament, and even in different parts of the scale of each of such syllables themselves. The number of these finger-key intervals, which any interval, larger than the enharmonic diesis contains, appears on inspection, when it is expressed in the new notation of Mr. Fary, by the number of $r^2$, or lesser fractions which it contains; thus, his expression for the fifth $353\Sigma + 7f + 31m$, (Phil. Mag. p. 35. vol. xxx.) shews that interval to contain seven half-notes or finger-key intervals, and by which the situation of its treble above any note on the clavier or range of keys on an instrument, or of its bass below any note, considered as the treble of a fifth, can with certainty be found. See Fifth.

FINGER-KEYED VIOL, a musical instrument, noticed under our article CLAVIOLE, which is another name for the same invention: at that time we had not had an opportunity of seeing this instrument, but have now the satisfaction of being able to present our readers with a drawing and description of it, having, for that purpose, obtained the permission of its inventor, Mr. John Isaac Hawkins, proprietor of the useful and mechanical museum, No. 79, Great Titchfield street, London, where are many curious mechanical contrivances, the most striking of which we shall occasionally notice. Plate XIV. Michelliany, is devoted to the elucidation of this curious piece of mechanism: a general idea will be given by inspecting the first figure, which is a perspective view of the whole instrument, laid open, while the remaining figures explain the construction of the more minute parts. The instrument contains 68 gut strings, stretched in a vertical position, and arranged in four series: the first, A, corresponding to the double bass, with 17 large strings, 13 of which are covered with wire; the longest string is 38 inches, and the shortest 28 inches; the second series of 17 strings, B, producing the tones of the violoncello, from 28 to 15 inches in length; the third, C, is the viola, from 15 inches to seven long, and the fourth, the violin, are from seven to three inches long. The frame containing the strings is of equal height in all parts, though the effective lengths of the strings are only to be reckoned from their respective bridges, a, b, c, and d, to the keys; each string is provided with a finger-key, which keys are arranged in the same order as in the organ, &c. and each finger is adjusted to sound the proper note for the key to which it belongs: the adjustment is made at the upper end of the string by a screw. To keep the instrument in tune, through all variations of the atmosphere, each string is stretched by a helical spring, attached to the lower part of the frame at one end, and to the string at the other; by this means the tension of the string is always equal, notwithstanding its variations of length from the state of moisture in the air, as the force of the spring will not be sensibly changed, by such minute alteration of length: these springs are seen beneath the keys of the instrument at b, i.e., and several of the tuning-fires are shewn separately in fig. 2. The end of the string, c, or of a wire to which it is tied, is hooked upon a pin projecting from the nut, a, of the screw, b, which is turned round by a small handle to produce the motion of the nut, and adjust the string.

The next parts to be spoken of are the refined horse-hair bows, which are the most ingenious parts of this invention; they are four in number, being situated at E, F, G, and H in fig. 1. one to each series of strings. The horse-hairs are arranged within a circular frame of brass, J, in fig. 3, A, where the method is shewn by which an approximation to a circle can be formed from a great number of similar and equal chords within a larger circle; it is in fact a polygon, but with so many sides as to render its difference from a circle insensible in its effects: the brass ring containing the hairs is fastened by three wheels g, d, and i, within which admit of its rotative motion, and at the same time allow the strings to pass down through the ring at m; and to be as near to the hairs as possible, without touching them: for this purpose each series of the strings is arranged in a circular form to correspond with the curvature of the bows at EFG and H in the principal figure. The circular bows are put in motion by a pulley on the axes of the wheel i, and a strap or band passing round this, communicates motion from a vertical axis, k, in fig. i, which is common to the whole, and is kept in motion by a wheel, on the axis of a crank, which is turned by the treadle 1, and provided with a fly-wheel, k, fig. 1, to regulate the motion, and continue it, while the treadle is ascending: the communication between the horizontal axis, l, of the crank and fly-wheel, and the vertical axis, k, giving motion to the bows, is made by two conical wheels, m and n, covered with soft leather, touching each other in their circumferences: this is an excellent substitute for toothed wheels, both with respect to the freedom and silence of the motion, as the toothed wheels, being necessarily constructed of metal, could not be devised of an unpleasing sound, not to be endured in a musical instrument.

The keys are constructed, as shewn in figs. 3 and 4, moving on a fulcrum at o, and by that means, when pressed down by the fingers, the opposite end elevates one arm of the bent lever p; at the same time the other arm is drawn back, and the wire, q, moves one arm of a second angular lever r; the other arm ends in a hook, which is engaged with the string corresponding to the key: from this arrangement, when the key is forced down, the string is drawn in contact with the hairs of the bow situated at j, just above the lever rer, and the friction causes the string to vibrate in the same manner as the violin.

It is scarcely necessary, after this, to say anything respecting the action of the instrument: the performer keeps the bows in continual motion by the treadle L, which moves with such ease as to be no impediment to the freedom of motion requisite for a performer on a keyed instrument; an increase of pressure on the keys causes that fulness of tone which is so much admired in the violin, and the delicate softness, produced by lightly touching the keys, is a principal advantage in this instrument; and it is a great recommendation, that by its assistance these excellencies of the violin are secured to every good performer on keyed instruments. The velocity of the bows is another circumstance to be attended to at the same time with the pressure: when moved slowly the tones will be soft and delicate; but when the velocity is increased the tones are full, and adapted for grandeur of effect; the alteration in velocity is easily made. Mr. Hawkins having adapted an ingenious balance weight to the treadle, which acts to turn the wheel while the treadle is ascending, so that by this assistance the wheel can be made to revolve exceedingly slow, without danger of pitching, or stopping at the highest or lowest points of the cranks: this ingenious contrivance is equally adapted to lathes, or other machines receiving motion from the foot, and will be explained under the article FOOT WHEEL.

In this manner the velocity of the bows is completely manageable by the greater or less pressure upon the treadle, and the performer may easily make a sudden transition from quick to slow, by retarding the motion of the treadle when he wishes to retard, or accelerating the treadle while it is depending to accelerate the motion of the wheel: it is worthy of notice that each bow moves with a different velocity, 

$\frac{2}{5} L$
been adapted to produce the vibration of the strings it is applied to; this is effected by the different diameters of the four pulleys on the vertical axis of the bow, which turns the bows; these are in such proportion, that when the double bass bow revolves at the rate of 35 times per minute, the others make 35, 50, and 75 revolutions in the same period.

The instrument is provided with pedals, one of which, when pressed down, brings a piece of metal in contact with the hairs of each bow, so as to cause no interruption for this necessary operation. Another pedal elevates the bows all together, and causes them to act nearer the bridge than when it is not in use, producing the effect well known to performers on the violin when they bow near the bridge; for this purpose the frame containing the three wheels, fig. 6, of the bow, terminates in a stem, which slides in a socket, and can be elevated or depressed by the pedal just mentioned. A third pedal brings a piece of leather lightly in contact with the middle of each string, which causes it to vibrate in two portions, and found the octave in a beautiful tone, similar to the musical glissades.

COUPERIN, tablature, a name given to the Sambe or Sal mund, which included also Brongniart and Salmon, which is the leaf of the trutre kind, and supped by several, without sufficient reason, as Pennant conceives, to be the fry of the salmon. It is frequent in the Wye, in the upper part of the Severn, and the rivers that run it in, in the north of England and in Wales. These fisheries are also common in the rivers of Scotland, where they are called Pans. Thole of the Wye are there known by the name of Skirlings, or Lappings. This fish resembles the trout, but the head is narrower, and the mouth less than that of the trout; the body deeper; length seldom exceeding six or seven inches; the pectoral fins have generally one large black spot, sometimes attended by a single small one; the purplous or fat fin on the back is never tipped with red, nor is the edge of the anal fin white; the spots on the body are fewer than those of the trout, and not so bright, and it is marked from the back to the sides with five or seven large blue bars, whereas it has been called fingerin or finery; the tail is much more forked than that of the trout. Some have erroneously supposed it the father of most of this species.

**FIN**

**FINGERING on Keyed Instruments.** This is a subject which, to treat amply, requires great knowledge, meditation, and experience; and so many examples and illustrations of the rules, as in entire volume could hardly contain, much less an article of a dictionary. We shall, however, give the principal elementary rules for the carriage of the hand, and economy of the fingers, in a few keys, which, by analogy, may be extended to the rest. Couperin (see Doughter) was the first who treated the subject with intelligence, in the minority of Louis XV. 1717; and though his compositions, for which the rules were given, have long since been thrown aside and forgotten, most of his rules are still good for music of a very different kind. He advises parents to place their children under an intelligent master, at six or seven years old, and prefers not only the manner of placing the hands on the keys, but the carriage of the person. The height of the feat, if allowed to sit at an early age, should be such as would place the wrists on a level with the keys; the fingers should be curved so as to be all of the same length, in as such each should cover a key. Something should be placed under the feet of very young students, to prevent them from hanging loose in the air, and to support their frames in just equililum; and this support should be diminished in proportion to their growth. The distance at which a person of mature age

should sit from the instrument should be about nine inches and less in proportion to the short arms of children. They should place themselves in the middle of the keys, in as natural and easy a posture as possible; the knees not too close, and the feet even. Great attention must be paid to the countenance of children, that no grimace or apperance of difficulty should be visible, and become habitual, which would be attended to by flanders-by more than the music that is performing, however good and well executed. M. Couperin even advises a glass to be placed on the desk of the young performers in danger of becoming ridiculous, that they may correct themselves. Particular care should be taken to place the hands even, and not let very young subjects attempt reaching octaves too soon, as it flattens the left hand, and makes it feel to belong to a different person from the other. The time or measure should never be marked by the head, feet, or the whole person, which is unbecoming and confirmed into affectation. Even in counting the time it should be done in a whisper, or else it tends to prevent the ear from having any share in the performance. The keys should be covered with fingers and thumbs there may be, and all the force should come from the upper joints, not from the weight of the hand, which would be heavy and thumping. Children in their early lessons should not be satisfied to practice alone; they are too giddily and playfully to remember the rules, till duly improved by care and habit. Couperin used to take away the key of the instrument during the first lessons, that they might not undo in his absence all that he had tried with great pains to inculcate. Shakes, beats, and trills, in all keys, must be early practiced with both hands extremely slow, and quickened by degrees; as must be the exercises for each hand, called evolutions of fingering; for which see music plate. The weak fingers of both hands, that is, the ring finger and the little finger, must be very much exercised, to make them, if possible, equally brilliant with the others. Chords, if the hands are well placed on the instrument, are perhaps the best rules for fingering; for if the notes can be well and easily struck together, there will be no difficulty in breaking them into passages. The rapidly running up and down the keys whatever number of flats and sharps there may be at the clef, depends on the thumb, which, in keys with flats, should be placed, in general, on C or F, and in most keys with many sharps upon B and E, that is, on a long key, which, if there are more than five sharps, will be E and B#. The thumb of each hand, as far as five flats, must be appropriated to F and C for the fame reason; but neither the thumb nor the little finger, in the rapid ascent or descent of the scale, should be used for a short key, unless in playing octaves or chords composed entirely of flats and sharps. In practising quick passages, the fingers should be lifted up with a spring, and not allowed to hang on the keys, till wanted again, unless in arpeggiosing chords, or in passages of expression. In the first practice of a flake, in order to keep the wrist quiet, place the thumb on the 5th, 4th, or 3d below, and keep the fingers that are unoccupied as tranquil as possible. Couperin was the first, we believe, who made it a rule for his scholars never to play two notes together with the same finger, unless in repeating chords. See examples of deviation, Plate N V.

No VIII. Shakes should be practiced with all the fingers. Transient shakes, double shakes, a chain of running shakes turned, a series of double notes in 3ds, 6ths, and octaves; in the two latter, the thumb and the little finger only can be used, and nothing but downright drudgery and perseverance can acquire these modern tricks, so unnatural to the genius of keyed instruments. Double shakes.
can only be gained, if at all, by long and patient practice. The experiment, however, should be made.

N. IX. In order to transfer the fingers to different parts of the instrument, upwards or downwards, without quitting a note which ought to be sustained, the young student should change the fingers upon the same note with both hands without letting the key rise. There is no harm in letting children play their first lessons by heart; it fortifies the memory; occupies the ear more than the eye; and, indeed, it is impossible for them to find the keys without looking at them, till the fingers fall mechanically upon certain places and cords, as the feet, in walking, move without the owner paying the least attention to them.

With respect to reading music readily, it must be acquired by playing first with one hand, and then with the other, several new pages of notes every day, without repeating anything; and when that can be done readily, at fight, with each hand separately, then let the pupil begin playing simple strains with both hands. This will be practice for the eye alone. But in learning to execute difficulties, it must be done by beginning slow, and repeating quicker and quicker a thousand and a thousand times; this is practice for the finger. Expression depends greatly upon the sustaining and cessation of sound; or, in technical language, on what the Italians term legato or solennata, and flaccato or fibrillo, as well as on accents, and the different shades of piano and forte.

In the evolutions of fingering, or short exercises to form the hands, it seems a paradox, but it may be truly said of Nos. III. and IV. that, by throwing a finger away, the fingers, in such passages, become inexhaustible.

In the course of these exercises, where the fingers are marked, the semicircle, or star, includes such notes as lie under the hand, without any contrivance or change; and in other places, where no fingers are marked, such are used as lie over the keys.

The detached passages, N. VII. are meant to be frequently quicker and quicker, till the hand is tired.

FINIGRIGO, in Botany. See PISONIA.

FINIA, in Geography, a town of Sweden, in the province of Schonen; 20 miles N. W. of Christiansfeld.

FINIA, in Ancient Architecture, the flower, fruit, or foliage terminating a pediment or pinnacle in the pointed style. This represented a lily, a trefoil, an acorn, a pomegranate, endive, &c. according to the taste of the architect or artist.

FINIANA, or FINANA, in Geography, a town of Spain, in the province of Grenada; seven miles S. of Baça.

FINICA, a town of Astatic Turkey, in Natolia, near the coast; 50 miles S. of Satalia. — Alfö, a river of Natolia, which runs into the Mediterranean, 14 miles W. N. W. of Cape Chelidoni.

FINIMARBOO, a town of Africa, in Bamburra; 96 miles W. N. W. of Sego.

FINING. See REFINING.

FINING OF WINE. The usual method of fining down wines, so as to render them expeditiously bright, clear, and fit for use, is this: take an ounce of tinctures, heat it into thin threads with a hammer, and diffuse it by boiling in a pint of water; this when cold becomes a stiff jelly. Whisk up some of this jelly into a froth with a little of the wine intended to be fined, then stir it well among the rest in the cauld, and bung it down tight; by this means the wine will become brighter in eight or ten days. This method, however, is found to be best suited to the white wines: for the red ones, the wine coopers commonly use the whites of eggs beat up to a froth, and mixed in the same manner with their wines. The method by which these vicious bodies act in the operation is this; they entangle themselves among the flying lee or light effluences that float in the wine, and thus forming a mass specifically heavier than the wine, they sink through the body thereof like a net, carrying down all the foulels they meet in the way to the bottom; but when the wine is extremely rich, so that its specific gravity is greater than that of the mass formed by the ingredients used in fining and the dregs or lee; this mass then rises upwards, and floats at the surface of the wine, which will in this case also draw off fine. See Clarification and Prunigie.

FINIRE, in Law, was used to fine, or pay a fine upon composition and making satisfaction. It is the same with flavum facere, mentioned in Leg. Hen. I. cap. 53.

FINISHING, in Architecture, &c. is frequently applied to the crowning or acroteria over a piece of building, placed there to terminate and finish it.

FINISTERRA, in Geography, a town of Spain, in the province of Galicia, near Cape Finisterre.

FINISTERRE, formerly a portion of Bretagne, in 48° 25' N. latitude, now the most westerly department of France, bounded on the N., W., and S. by the sea, and on the E. by the departments of the North coasts and Morbihan, estimated at about 50 miles from N. to S. and 40 to 45 from E. to W., and containing 543 square leagues, and 474,049 inhabitants. It is divided into five districts, viz., Presqu'ile, having 149,610 inhabitants; Morbihan, 169,943; Chateaulin, 82,131; Quimper, 84,074; and Quimperle, 48,620. Its capital is Quimper, and its other chief towns are Bred, Morlaix, Chateaulin, Leseune, Landerneau, Crozon, Bric, Quimperle, and Bannalec. Its chief rivers are the Aude and Odet. The number of its cantons is 257, and that of its communes, 257; its contributions amount to 2,458,757 francs, and the expenses charged upon it are 315,193 f. 66 c. This department is tolerably fertile, producing grain, flax, hemp, fruits, and good pastures, with mines of iron and lead.

FINISTERRE, Cape, Galactic Promontorium, called Arbrectum by the ancients, and by some Nereum, a cape on the N. W. coast of Spain, in the province of Galicia. It is nearly S. or a little westerly, about five leagues from cape Toriano, and ships may anchor on the E. of a large rock, in six or seven fathoms, where is a great bay that runs far inland. Forty-two leagues from Cape Finisterre, there is a large rock above water, dangerous to navigators. N. lat. 42° 53', W. long. 9° 16' 15".

FINITE, something bounded or limited, in contradistinc-
tion to infinite.

The schoolmen make two kinds of finite; viz. the one as to extent, which is applied to things that have not all possible or conceivable extension.

The other as to perfection, applied to things which have not the last perfection.

To get an idea of a thing finite in point of perfection, we first conceive the thing as having certain perfections; and then conceive some other perfection which it has not, or some perfection in a further degree. After the first instance I conceive a room to be finite, by having an idea of expansion beyond what is contained therein.

FINITO, Ital. in Music, a canon or figure is said to be finite, i.e. finished, when it is not perpetual, but when at some certain place all the several parts stop together on the end of the key note; after having followed each other for several sounds, on signal being given by the leading part holding up his finger. See Canon.

FINITOR,
FINLAND, in Geography, a country of Europe, bounded on the north by Lapland, on the east by Russia, on the south by a gulf to which it gives name, and on the west by the gulf of Bothnia. This country was formerly divided into Russian and Swedish Finland. The former, or Russian Finland, anciently belonged to the Swedes; but it was partly ceded to the Russians by the peace of Nyklaed in 1721, and partly at the treaty of Abo in 1732: its capital is Viborgan, and it now constitutes the government of Viborgan. (See Viborgan.) The limits of Russia and Sweden, settled by the peace of Abo, are formed by the river Kyman; which flows into the centre of the gulf of Finland; on the south bank of which are a wooden house, a rampart of earth, and a small battery. The frontiers are defended by Frederiksborg, which lies. This province retains most of its ancient privileges, with some modifications under the new government. The country produces, besides flax, wheat, rye, oats, and barley, but not sufficient for the inhabitants. Viborgan retains its own civil and criminal courts of justice; in penal cases, not capital, the punishments prescribed by the provincial judicature are inflicted; but whenever a criminal is condemned to death, the Russian laws interrupt, reprove him from the sentence of beheading or hanging, &c. enjoined by the Swedish order, and confine him to the knot and transportation to Siberia. In the governor's court business is transacted in the Swedish, German, and Russian tongues; the peasants use only the Finnish dialect, but the inhabitants of the towns understand also Swedish, and many of them German. The Lutheran is the established religion of the province, but the Greek worship has been lately introduced by the Russians. This part of Finland is not so extensive as Swedish Finland. It is remarkable, that in both countries the productions of nature are sooner ripe in the parts covered with forests, than on the sea-coast and islands. The interval between feed-time and harvest is from 10 to 12 weeks. The Finns apply principally to the culture of hemp, flax, and tobacco, which thrives well in their country. As to trees, those which bear fruit, such as cherry and plum-trees, are almost always destroyed by the rigour of winter; the mulberry is planted and thrives only on the islands; the oak is laid not to grow beyond 61°, and the ash beyond 62°. The forests of fir r furnish in Finland the principal articles of commerce in wood, charcoal, timber, and planks, which are sent to Viborgan, Stockholm, &c. for exportation. The country abounds with game, and in the lakes and rivers various kinds of fish are plentiful. At the bottom of the morasses they dig earth, from which iron is extracted, and they have some mines of lead. The peasants of Finland differ very much from the Russians in their aspect and dress; most of them have fair complexions, and many of them red hair, which they part at the top and allow to flow at considerable length over their shoulders; they also have their beards; whereas the Russians have generally dark complexions and hair, which they cut short, and they also suffer their beards to grow. The Finns, by their commerce with foreigners, are in general more civilized than the Russian Finns who do not reside in the capital or in their vicinity. The small-town villages of Finland afford much better accommodations than are usually met with in the largest towns of Russia. In the 12th century great pains were taken to convert the Finns to Christianity; and Henry, who was bishop of Uppsal, in 1157, fell a martyr to his zeal in the accomplishment of this benevolent design. That prelate founded the first cathedral in Finland at Randamoki; but the fee was afterwards transferred to Abo, not far from the former place. Martin Skye, and Peter Sekkila, were the first promoters of Lutheranism in this country. The provinces of Swedish Finland are Finland Proper, the Isle of Oeland or Aland, Orkobothnia, Tavakaland, Nyland, Savolax, and that part from Sif to of Kymene and Carelia, which Sweden retained to itself; but the whole of Finland has lately (1829) been ceded to Russia; in consequence of the unsuccessful struggles of the Swedes to maintain their independence; and by the treaty of peace concluded between Russia and Sweden, and signed at Fredericksborg, the incorporation of the grand duchy of Finland with the Russian empire was confirmed. The town of Torne, and the river of the same name, form the frontiers.

FINLAND Proper, a province, lately belonging to Sweden, situated on the southern part of Finland, considered in its utmost extent, bounded on the S. by the gulf of Finland, and on the west by that of Bothnia; about 160 miles in length and 15 in breadth. The soil is fertile, and the land, especially in the southern parts, produces good corn, hay, and hops. It has several fine lakes and rivers, which yield abundance of fish, and on part of the coast is a pearl fishery. The inhabitants subsist by agriculture, grazing, fishing, and the manufacture of woolen ware. The principal articles of their commerce are grain, meal, cattle, butter, tallow, linen, yarn, stockings, &c. Finland is divided into two and four; the capital of the former is Birnborg, and that of the latter Abo.

FINLAND, Gulf of, that part of the Baltic sea which washes the coasts of the governments of St. Petersburg, Revel and Viborgan; it is above 400 versts in length, and from 100 to 120 in breadth. The gulf of Finland is of difficult navigation, both on account of the heavy gales of wind that are to frequent here, and the multitude of rocks and shales with which it abounds.

FINMARK, called also Lapmark, a province of Norway, bounded on the N. by the northern ocean, on the E. by the northern ocean and the territories of Russia, on the S. by Swedish Lapland, and on the W. by the northern ocean. The coast of this country is well inhabited, but it has neither towns nor villages. The inhabitants subsist chiefly by fishing, and their country yields the best salmon in Norway. The sun, such is their latitude, continues above their horizon in summer for some weeks. Finmark has a particular governor, regiller, and judge. It is divided into Weft Finmark, which includes twelve churches and chapels, served by five preachers; and Eait Finmark, in which are nine churches and chapels, served by three preachers. See FINNS.

FINN, a river of the country of Donegal, Ireland, which flows from a lake of the same name, and, after a course of several miles in an easterly direction, joins the river Foyle, near Strabane.

FINNERYDIA, a town of Sweden, in Weft Gothland, 34 miles S.W. of Orebro.

FINNHAR, a small island on the west side of the gulf of Bothnia. N. lat. 60° 58'. E. long. 17°.

FINNIKIN, in Ornithology, the name of a particular species of pigeon, called by More the Columba in grun fletens. It is of the shape and size of the common pigeon. The crown of its head has something of the resemblance of a snail's head; and it is gravel-eyed, and has a tuft of feathers on the hinder part of its crown, which runs down its neck not unlike a horse's main. It is not feather-legged, and is in colour always either a black or blue pied. They have their name from their singular manner of courting the female, which is always by rising over her
FIN and making three or four turns, flapping the wings, and then turning many times round the other way.

FINNIS Bay, in Geography, a bay of Scotland, on the east coast of the island of Harris. N. lat. 57° 53'. W. long. 6° 55'.

FINNS, a race of perfons, who are said to be the aborigines of Russia, and who inhabited the regions of the Volga and the Duna. These people, though they form one main item of the inhabitants of Russia (the Slavonians being the other), have never, in any of their branches, risen into a ruling nation; yet as they are the common flock of most of the northern nations of Europe, they are distinguished by their antiquity, and by their wide extent from Scandinavia to a great distance among the Alpatic nations of the north, and thence again to the shores of the Volga and the Caspian. Although the Finns have been thus widely intermixed, yet they have preserved a general resemblance in bodily frame, in national character, in language, and in manners. It is also remarkable, that the greater number of those who belong to the Finnish race, still dwell only in the north, which has ever been their favourite abode, and on which account they are called inhabitants of morasses or fens; and the fishery and chase have been their chief occupation and trade. Which of these widely intermixed people has the best claim to be considered as the parent flock, it is not easy to decide. The aboriginal name of Finns, known to the Roman historian Tacitus, is not in use with any of these nations; but they call themselves by a different appellation. None of these people have ever exhibited a conspicuous figure on the theatre of the world, nor acquired a permanent independence; but they have all, as far back as history can trace them, been a prey to their more enterprising and powerful neighbours. Accordingly, they have no chronicles of their own; and their history is only to be found in the annals of their conquerors. Of their ancient history nothing certain is known, except that they polished the greater part of Scandinavia and Russia in the north, and separated into several tribes, which either lived entirely without any government, or, like the Permians and proper Finns, under their own kings. All these were gradually subjugated by three nations, under the dominion of which they still remain; viz., the Norwegians, the Russians, and the Swedes. The Norwegians were the first who subjected a part of the Finnish north. Finmark, which is a large province extending even to the eait of Cape Nord towards Russian Lapland, has ever been tributary to them. Yet it appears that, long before the commencement of the 10th century, the whole tract, from Wardhys to the White sea, was independent of them; and that only the remoter Finns, about the gulf of Bothnia and Finland, and on the Duna, obtained their national freedom.

The inhabitants of Finmark have been amply described by Levens (De Lapponibus Finmarcia, Copenhagen, 1767, 4to.) cited in Pinkerton's Geography. This race of men, he says, is of small size, generally about four feet, with short black hair, narrow dark eyes, large heads, and high cheek-bones, a wide mouth, and thick lips, and of a swarthy complexion. In the southern part of Finmark they are mingled with Norwegians; but the northern wilderness is wholly their own. They call themselves "Same," their speech "Same-giel," and their country "Same-edna," being probably of the same race as the Saimoens. The language has only an affinity with the Finnish, but not nearly so much as the Danith has with the German; and, it should seem, that they had ananciently a different speech, which they enriched with large additions from that of their more polished neighbours the Finns. Towards the shore they build huts; and on the mountains use tents of a flatly conic form, and divided into two parts by a kind of passage; each part having three rude subdivisions; the two outer for the manner, mistrels, and guests; the middle on each side of the fire for the children; and these near the door for the servants: behind these the cattle find a refuge, but the cattle are few, the rein deer constituting their chief wealth. The sun abhors himself for seven weeks, and yet from ten in the forenoon to one in the afternoon, the twilight will enable a person to read without a candle; nevertheless the stars are visible, and the moon, when apparent, shines all the day. The sun never sets for seven weeks in summer; but in the night his beams are dull, and he assumes a redder hue. Several rivers, particularly the Tana, in eastern Finmark, sometimes much swelled by the melted snow, supply salmon and other fish, the chief food of the Laplanders; though at a festival they have mutton or reindeer, and mead. The men wear conic red caps, lined with fur, and a kind of robe of cloth or skin; the poor sometimes use that of salmon, which appears like a white flagnen; the head and neck are protected with a sort of coat, and the veil is of undress-then-flin, with the wool towards. The head-dresses of the women is narrowed in the middle, widening like a bason at the top: the veil and robe referable those of the men. Their annuements are floothing with the bow at a mark, a kind of tennis, and a game resembling draughts. They are also fond of wrestling, and other exercises. They were formerly addicted to magic, and were fabled by ancient times to invoke a demon in the shape of a fly, which was called the "gan-fly," and commissioned to sting their enemies. Till recent times they were immersed in paganism, regarding particular mountains and rocks as gods. Their chief god was "Radem," who dwelt in the fiery heavens; in the lower aerial regions were "Berti," or the fun, a god, as Grotius has observed, very unjudiciously; with "Horangalis," or the thunderer, and other divinities. On earth were the gods of hunting and fishing; and the goddes of "Maderon." with her daughter "Sarakka," a kind of Venus, who prepared the body; after Radem had been the soul. The "Saivo Olmak," or gods of the mountains, were supposed to be oracular. The places of sacrifice were chiefly holy mountains, near the birth of Waranger, and along the Tana, and some on the bay of Porsanger. Their magical fongs and drums are very trivial. For the conversion of the Laplanders to Christianity, Eric Bredal, bishop of Drontheim, made some vain attempts about the year 1660; but the royal mission was not founded till 1714; and extended to the Laplanders of Finnmark, with those of Novland to the south, being a considerable portion of this dioce of Drotheim. Since that period, the missionaries have been reftoluate, and indulgent, and successful; there being commonly two for Finnmark, one for the east, who preaches over Waranger, Tana, and Laxeford; the other for the west, over Porsanger, Haivalund, and Alten.

The Russians were the people who, next to the Norwegians, intermixed themselves among the Northern Finns; and though at first, on their settling about the Volkhof, they lived on good terms with their neighbours the Tschudow or Finns, and soon elected a government conjointly with them, yet afterwards they, later than the Norwegians, and earlier than the Swedes, conquered and subdued them. At first the Russians had merely the region about the gulf of Finland, or on the Kyrababolon, and about the Ladoga lake, quite up to the White sea. They afterwards spread farther round in these defart countries, and subjected to themselves a part of Finland. In the sequel they took not only the whole
whole of Lapland round Kola, but proceeded to levy a tribute on the Finns in the present Finnmark, and on those who dwelt in Trondem as far as Malanger. The other Finnish nations in the East, on the Volha, and in Siberia, became subject to them with their gradual extension into the regions, by the conquest of the Tartar kingdoms and the discovery of Siberia. The Swedes were the last who founded a sovereignty in the Finnish parts of the North. It was not till the middle of the 12th century, about the year 1157, that king Erik, the faint, undertook the subjugation and conversion of the proper Finns: 150 years afterwards the Swedes entered Tavastland; towards the end of the 13th century they established themselves in Karelia; and about the same time the Laplanders were also reduced under their authority. Thus the whole of the Finnish North was partitioned among three sovereigns, and the nation itself was removed from the rank of an independent people. Of the 13 tribes into which the Finnish flock was divided, 12 belong either wholly or in part to the inhabitants of the Russian empire; viz. the Laplanders, the Livs, the Tchekoffi, the Tschachasches, the Mordvines, the Votaks, the Permians, the Szyranes, the Vaganes, and the Kondish Oltists. The Madihares alone, the great mass of the mixed multitudes whom we at present call Hungarians, are the only Finnish nation which belongs not to Russia, and also the only one that has preferred its national independence.

The country which is inhabited by the Finnish nation comprises the north-eastern corner of the Botnic and Finnish gulfs, interspersed throughout with mountains, rocks, moraines, and lakes, between the 63rd and 65th degrees of N. latitude; its circumference being computed at 30,000 versts. The greater part of it did belong to the kingdom of Sweden; the smaller southerly portion, till of late possessed by Russia, contained Ingernland, Kexholm, and Karelia, forming the government of Vyborg and Wibarg, and part of that of St. Petersburg. In the government of Vyborg, the Finns compose by far the greater part of the inhabitants, or more properly they are the people of the country. In most of the circles of the Peterburg government, they, with the Ingrians, are known by the doiemy of the population: and in the government of Viter and Novgorod, they form considerable colonies, which have long been settled in these regions. The number of all the Finns living in Russia cannot be correctly ascertained; but they probably exceed 400,000 persons. Tooke's Russ. Emp. vol. i.

FINNO, in Geography, a town of Germany, in the Upper Mark of Brandenburg; 32 miles N. E. of Berlin.

FINSCALE, in Ichtyology, an English name for the river fish, more usually called the rudd, the rutilus latior, or rubello fluviatiles of authors. See Cyprinus crypoophthalmus.

FINSPAAGE, in Geography, a town of Sweden, in East Gotland; 15 miles N. W. of Nordkioping.

FINSTER-AAR-HORN, a high mountain of Switzerland, in the canton of Bern; the elevation of which has been found by actual measurement to be 14,116 English feet.

FINSTER Muefler, a town of the Tyrolese; 12 miles N. E. of Trafp.

FINSTERBACH, a river of Franconia, which runs into the Rednitz, 2 miles N. of Roth.

FINSTERWALDA, a town of Saxony, in the marquessate of Meissen; 30 miles N. of Dresden. N. lat. 51° 37'. E. long. 13° 36'.

FINTO, Ital. in rustic, implies a feint in preparing for something that is not performed, as cedam e reinita implies the making a full close expected, when, instead of the base failing a 4th or raising a 5th, another unexpected base and its harmony are given, which at present is called a disappointed caden e, and may be brought about various ways.

FINTONA, in Geography, a small port of Ireland, in the county of Tyrone, on the road from Omagh to Enniskillen; 7 miles S. from Omagh, and 94 miles N. W. from Dublin.

FINITRAT, a town of Scotland, in the county of Stirling, containing about 1000 inhabitants; 8 miles S. W. of Stirling.

FINVARA POINT, a cape of Ireland, in the county of Clare, on the southern coast of Galway bay. W. long. 9° 4'. N. lat. 53° 7'.

FINDA, a town of Asiatic Turkey, in Natolia, in the gulf of Satalia; anciently called Phot_props, near a famous pass into Pamphilia; now the site of a Greek bishop, though much decayed; 28 miles S. of Satalia. N. lat. 36° 36'. E. long. 32° 26'.

FIORE, a river which rises in the Sienaese, and runs into the sea below Montalto, in the duchy of Calto.

FIOREAVANTI, Lfownard, in Biography, a physician of Bologna, in the sixteenth century, who possessed a considerable degree of reputation among his contemporaries, not only on account of his knowledge in medicine, but also of his chirurgical dexterity. Nevertheless he was an arrant empiric, in the modern sense of the word, and in the writings which he left behind him, he dwells at great length on the excellence of the secret remedies which he poiffed, and is violent in his condemnation of blood-letting. He died on the 4th of September 1588. The titles of his works, which are in Italian, are as follows: "Del Specchio di Scienti Universale," Venice, 1564. "Regimento della pelle," ibid. 1565. "Capricci Medicinali," ibid. 1568. "Il Teforo della vita humana," ibid. 1570. "Compendio dei Secreti Naturali," Turin, 1580, Venice, 1581, &c. "Della Ficica, divisa in Libri Quattro," Venice, 1582, "Cirurgia," ibid. 1588. All these works have undergone several editions. —Eloy.

FIORANTINO, in Geography, a town of Italy, in the Campagna di Roma; 25 miles N. of Tarentina. N. lat. 41° 42'. E. long. 13° 6'.—Alfo, a town of Naples, in Capitanata; 7 miles S. of Lecan.

FOIENZIOLA, a town of Etruria, in a valley of the Apenines, on the site of the ancient Fidentia; 22 miles N. of Florence.—Alfo, a town of the duchy of Parma. —Alfo,
FIR

—Allo, a town of Naples, in Capitanata, anciently called Florentium; now decayed; 10 miles S. of St. Savaro.

FIORI, MARIO DA, in Biography, a painter of flowers, whose real name was Mario Nuzzi. He was born at Perona in the kingdom of Naples in 1623, and studied with his uncle Tomafo Salini. He imitated the lighter productions of nature, as flowers, shells, &c. with great beauty. A fulness and richness of touch and colour are given by him with great elegance and lightness. It was so much the talk of the time to admire his productions, that he could not keep them all enough for the demand; and what was more to his credit, Domenichini and other artists of renown were not ashamed to paint in conjunction with him. One of his most capital works is in the church of St. Andrea della Valle at Rome. It is a wreath of flowers encircling the portrait of St. Gaetano, which was painted by Andrea Camaschi. At Wilton is a very beautiful painting of his; a wreath of flowers round a head of the virgin, by Carlo Dolci. He died in 1673, at 70 years of age.

FIORITO, Ital. is a musical term, implying flowery, ornamented; as canto fiorito, fluid long, contrapposto fiorito; to dilligush them from canto fermo, and contrapposto semplice.

FIORLITA, in Geography, a small island of the Mediterranean, at the entrance of the gulf of Taranto. N. lat. 40 deg. E. long. 18 deg.

FIORONI, GIANN ANDREA, in Biographia, maceto di cappella at the great church or Duomo in Milan, about the middle of the last century. He was an excellent contrapuntist alla Palestrina, that is to say, in the style of our best old masters in their services and full anthems, which consist of good harmony, ingenious points and contrivances, but no melody. Sig. Fioroni is a voluminous composer and publisher of masques and motets in eight parts, a due lori. So that though this style, and that of the church, are abandoned in Italy, on days of festival, when instruments and secular singers are employed, the ancient grave style of the 16th century is not wholly lost.

FIR-Tree, in Botany. See ADET and Pinsus.

Fir-Tree, the common name of a tree of the evergreen timber kind, frequently met with in the more elevated and mountainous situations of the colder climates of the north. It has, for the most part, single leaves, which are produced on every side of the branches. This is a tree, which is capable of being raised upon almost any part of soil which is not very retentive of moisture; and it is both rapid in its growth, and hardy in its nature, but not perhaps so ornamental as some others of the evergreen kind.

The usual method of raising these trees is by sowing the seeds taken from the well ripened cones which they produce. The mode of extracting the seeds from the cones is, either by expelling them to the gentle heat of a fire, or by foaking them for a short time in warm water, by which they readily open and emit the seeds. The former method is the belt, when due attention is paid not to expel them to too great a degree of heat. This should not however be done until the period of sowing or putting them into the ground. The belt way is to sow them in a nursery where the land has been well prepared, in order that they may be well protected from the ravages of birds at the time of their coming up; as they are very apt to destroy them at that period, by picking off the buds of the seeds which come up along with the plants.

The proper time of putting the seeds into the ground is about the end of March, or beginning of the following month. They should be sown on a bed of light earth, and covered to the depth of about half an inch by means of a garden rake. The plants should be continued in this bed until the following spring, being kept perfectly clean from weeds. At that time other beds should be put in a proper state of preparation for receiving the young plants; into which they should be carefully transplanted in rows, at the distance of fix or eight inches from each other, and three or four inches apart in the rows. When the season happens to be very dry afterwards, it may be proper to water the plants once or twice a week according to the heat of the weather: and in some cases it may be requisite to cover the beds with mats in order to screen them from the sun and drying winds, until they have taken good root; after which a further care is necessary, except that of keeping them free from weeds. The plants may continue in these beds two years; at the end of which time they may be removed into other spaces of open ground properly prepared for them, being placed out at such distances as may be most suitable for them. The most usual distances in these cases are four or five feet from row to row, and two or three feet apart in the rows.

After they have been planted out, when the weather happens to be dry, they should have a good watering to settle the mould to their roots; and which may be repeated three or four times, in case the season continues dryness, with great benefit in promoting their taking root, and securing them from the effects of drying winds.

The plants may remain in these situations for two or three years longer, or until they may be wanted; during which time the ground should be dug between the rows in every spring, and be afterwards kept perfectly clean from weeds by frequent hoeing, care being taken in the diggings not to cut or injure their roots. This is all that is requisite in their cultivation while they remain in such boxes.

When they are to be removed into the situations where they are to remain, great care is necessary in taking up the plants, not to cut off or hurt the roots, nor to suffer them to continue any length of time exposed out of the ground, before they are replanted. The most safe time for performing the Luminas of removing this fort of trees for finally planting out in mould is in the beginning of April; though in dry lands they may often be planted about Michaelmas, with success.

Fir trees are frequently grown at the height of fix or seven feet and sometimes more, but the height of two or three feet is much better, and plants of this height generally, in the course of a few years, surpass those that have greater heights when first set out.

The fir, or large sort of plant, must, at first planting out, be always well secured by stakes or other means, in order to prevent their being moved and made loose by winds, which, whenever they occur, are sure of destroying the trees. These small plants only stand in need of having the mould firmly trodden in about their roots during the time they are planting out.

The chief improvements that have been made by planting large masses of trees of the fir kind on the poor, bare, bleak, exposed, moary, and heathy situations in the northern parts of Scotland, sufficiently shew their importance, and plainly demonstrate the advantage of such undertakings in such places, where properly managed. And though it may be admitted that the Scotch fir is amongst the most pernicious and least valuable sorts of timber wood that can be raised, and consequently sells at a very low price; yet as the expense of rearing it is very large, the returns are in all cases so abundant as to fully satisfy those who have engaged in the forming of such plantations. This has even been the case when no other circumstance but the direct in-
conce which has arisen from such plantations themselves has been taken into the account. But when the collateral advantages are considered likewise, the benefit occasioned by them is evidently extremely great. It has been stated by the author of the "Essays on Rural Affairs" that in the vicinity of plantations of the fir kind, housetops can be raised at no little expense, and the roofs are so much straighter, and better than the ordinary ones, that settlers in such situations are induced to make their houses much neater and more commodious than in other places; and besides rails, and other kinds of materials for dead fences, can be easily procured, that the poor people are first enabled to have good walled gardens, and then commodious enclosures of larger extent; the branches likewise afford fuel to them, which adds greatly to the comforts of their situation. The cutting and manufacturing of the wood into various kinds of utensils furnish employment for a great many persons; population is thereby increased, and with an augmentation of population, its necessary consequence, the desire for land to produce the necessaries of life, and of course an increase of rent to the proprietor. These new settlers in the desert wastes of Scotland, like those in America, cultivate and improve the soil in proportion as the trees are removed from it. At this moment, it is added, Mr. G. Dempster, who will be long respeoted by his countrymen, fees fields on his estate rapidly converting, in this way, the plantations into a valuable growth, and yielding him ten or twelve shillings per acre in rent, not only without any expense to himself, but after having derived a considerable profit from the sale of woods of his own planting, which grew upon land that twenty-five years ago was not worth to him above two pence the acre, and which might have remained in that state, perhaps for ages to come, had it not been planted at all. It is contended by the same writer, that it is by a judicious management of this sort that men of large landed estates, by a little fore-fight, find themselves enabled to provide both employment and subsistence, with much profit, to a numerous people, who must otherwise have either remained in a destitute condition, or have abandoned a country, which did not properly provide for their accommodation.

It may be remarked likewise that a plantation of Scotch firs may be made at much less expense than of any other fort of trees in those northern parts of the kingdom, as the young plants can be afforded at a lower price than any others. In Aberdeenshire, where planting is so general as to have become a sort of occupation, for plants of two years growth, above which age no experienced planter will ever buy them, sometimes will be sold at the very low rate of fourpence the thousand, which consists of twelve hundred plants; and they formerly seldom exceeded eightpence; on the average about sixpence, or one halfpenny the hundred: but they have lately been considerably higher. There are men who make a business of forming plantations, who will undertake to complete the whole, enclosing and planting, at the distance of one yard each way, and uphold them for five years, that is, supply any deficiencies that may take place, at the rate of from ten to fifteen or thirty shillings the Scotch acre, which is nearly equal to one and a quarter English, according to the size of the inclosure, and the nature of the fence. In all cases of this kind, it is supposed that the plantations are of the extent of thirty or forty acres or upwards; for where the inclosures are smaller, the expense of inclosing is proportionally augmented. The charge is thus not only rendered moderate, but the whole of the expense that is to be incurred, ascertained before the plantation is begun, by which the being involved in unforeseen difficulties is fully obviated.

Experience has fully shown that there is scarcely any soil so bad, or any exposure so bleak, that the fir-tree will not live in, if the plantation be of sufficient extent, and not upon the very summits of high peaked hills. They do not indeed bear the sea air very well, where they are much exposed to the severity of its blasts; nor is the wood ever of so good a quality, or the tree long lived, upon soils of the clay kind. It has been found that in the southern parts of the kingdom, the pinecarr bears the sea blast much better than any other of the fir tribe. This is a discovery of great importance, and which deserves the attention of improvers in the way of planting. The spruce fir will however bear a still more exposed situation than the Scotch fir; and after a few years from the time of planting, it shoots up with still greater luxuriance. This is the case probably only in particular situations. But the cones are not to be had in equal abundance; and the plants being more difficult in the rearing, they are sold at a much higher price, usually about four shillings the thousand, fit for being planted out. In a good soil the silver fir also prospers well, and is a beautiful tree, on account of the depth of its shade; but the price of the plants is too great to admit of large plantations of it being made with advantage. But wherever the situation is bleak, and much exposed to strong blasts of wind, the plantation must not only be of considerable extent, if the trees be expected to thrive, but it must be formed in miles, where the lower plants may stand at the distance of two to three feet at most from each other. The more exposed the situation is, the closer they should be planted; as it may be observed that until the branches begin to intermix, and give a mutual support to each other, the trees never begin to advance with vigour. Where the plantations are thus thick, there is a necessity for beginning to thin them out at a pretty early period, so that after the tenth to the fourteenth year from the time of planting, persons must be constantly employed in thinning them: and there are very few situations, indeed, in which the thinnings cannot be disposed of to advantage, or in which such sorts of plantations cannot be made.

It has been remarked by an able writer, in the Transactions of the Bath Agricultural Society, that though he does not think that the Scotch fir can, in this country, ever equal the yellow deal from the Baltic, yet it may be worth propagating, as being useful in ordinary buildings. The drier the soil is on which this sort of timber grows, the flower is its progress; and the closer its pores, the more it adds to its beauty. Where plantations are formed, the fir will shoot three or four feet in a season, and equal, if not surpass, the oak in growth. In his plantations, though chiefly confined to chalky banks, in a north-west exposure, the trees eince, that when once rooted, few obstacles will prevent their profitable progress. From observing the mistakes of others in endeavouring to ornament their naked downs too suddenly, he has learnt the necessity of planting firs only when a foot in height, and by opening the ground some time before, inverting the turf at the bottoms of the holes, and throwing the mould upon it in hilly lots to meliorate, his plantations succeeded well: for though the soil is scarcely fix inches in depth, the first set in 1760 are now 30 feet in height, and from two feet six inches, to two feet, in circumference, at four feet from the ground; some few planted at the same time in a deeper soil, and warmer situation, are now about three feet round. And spruce firs, planted in 1766, likewise in a tolerably good soil, are now 40 feet in height, and from two feet ten inches and a half, to three feet, round. But he has seen plantations that far surpassed either of these in growth; they however occupied ground which was infinitely more valuable. See Pinus.
FIR


hard, scarce seasons the tops or shoots of the fir tree have been utilized as a food for cattle, sheep, &c.

Fir. Most upright. See Lycopodium.

Fir, Scotch, in Botany. See Pines.

Fir-cones, fossil, in Natural History, are extraneous fossils, resembling the cones of the fir-tree. Numbers of these have been described by different authors, who appear evidently to have confounded recent and peat fossils with those belonging to, or found lodged in the undisturbed strata, or to have had but slight evidence of the identity of the fossils with recent cones. We have been told that a very perfect fir-cone was, a few years ago, found at Aspley in Bedfordshire, not many inches beneath the foil, in a completely rigorous state. The many fossils that have been published respecting the petrifying springs of this place, would have induced the writer to have taken no notice of this, had it not been related to him by a gentleman of veracity, and a competent judge of these matters; but since he has had himself the opportunity of making enquiries on the top of concerning this fossil.

Fir-wood, fossil, has generally been that obtained from out of peat mofles, in which recent fir-trees have been preserved during the growth of the peat; and, as Mr. Parkinson thinks, have undergone a degree of the bituminous fermentation (which fee), by which their inflammability has not only been preserved, but in some instances heightened. The same gentleman (Organic Remains, i. 440.) figures a fossilious remain, (Plate II. fig. 4 and 5,) which he describes as a piece of fir, but we think without offering sufficient proof of its identity to any of the recent fir tribe.

FIRABUS, in Geography, a town of Peru, in the province of Mecan; 45 miles W. S. W. of Kidger.

FIRAN, a small island in the Red sea, about 18 miles from the coast of Arabia, celebrated for its fisheries of pearl. N. lat. 17° 13'. E. long. 45° 30'.

FIRANDO, an island and kingdom of Japan, with a good harbour, in the sea of Corea. N. lat. 33° 35'. E. long. 135° 40'.

FIRE. This word has been used to express things somewhat differing from each other; yet bearing analogy to its most usual and most common signification, which is that of an active natural process, attended with the emission of heat and light, and likewise with the decomposition of certain substances, which are said to be burning, or in a state of combustion, during the processes, and are said to be burnt after the termination of the processes.

The general use of fire, which comes continually under our observation, suggests to our minds the meaning of the word perhaps much more readily than the recollection of the above stated definition; the latter, however, is attended with this advantage, namely, that it defines the limits of the meaning, whereas it prevents its equivocal application.

The various spectacles which fire exhibits to our senses; its alluring effects, and the innumerable uses to which it may be applied, have, at all times, rendered it an object of the utmost consequence to the human species. The newborn infant generally fixes his eyes to the flame of a candle, or to a common culinary fire, in preference to any other object; and a more advanced age the various means of exciting and of employing fires occupy the thoughts of a very great portion of the human species; and the industry of philosophers has at all times endeavoured to investigate the nature, and to account for the effects of fire.

It is not every kind of bodies that are capable of combustion. Those which are capable of supplying a fire, or of being burnt, are called combustibles, and such are either simple, as hydrogen, sulphur, and phosphorus; or compound, viz. those which consist of various substances together with a notable proportion of one or more of the above-mentioned simple combustibles; such as wood, coal, oils, &c. Several other bodies are not combustibles; those, however, may, by the action of a fire, be rendered red-hot, so as to emit heat and light, but they do not undergo any decomposition; or if they do undergo any, it is not of that kind which a fire produces amongst bodies that are really combustibles. The incombustible bodies that are rendered red-hot, are said to be in a state of ignition, or of incandescence, and this incandescence, which emits heat and light, exists no longer than the cauè which produces it; for after that it begins to diminish, and gradually vanishes; whereas the real combustibles, when once set on fire, continue of themselves to burn until their whole substance is changed into something quite different from what it was before the combustion.

Sometimes a substance which is actually combustible, may, when placed in a common fire, be only ignited, and act like an incombustible body; that is, without undergoing any perceptible decomposition. The reason of this is, that the given combustible requires to be exposed to a very high temperature before it will suffer decomposition; therefore when placed in a lower temperature, yet sufficient to render it red-hot, it will then only acquire a state of incandescence. Thus a diamond, which is perfectly combustible in a very high temperature, may be made repeatedly red-hot and cooled, without the least alteration of its nature.

It may also happen that a combustible body may be placed in a degree of temperature much higher than that which is necessary for its combustion; yet the combustion will not take place for want of some of the circumstances upon which that process necessarily depends. Thus a piece of charcoal placed in a close vessel may be rendered red-hot, and may be kept in that state for any length of time, without undergoing the least decomposition. The reason of which is, that in a close vessel no oxygen gas can come in contact with the ignited charcoal; and without the presence of oxygen, or of substances which can yield oxygen, no combustion can take place. See the articles Combustion and Excitation, wherein whatever belongs to the theory of combustion will be found.

From the former of these articles it appears, that no fire can continue long without a constant supply of a combustible substance, and of oxygen; for the whole process consists in a decomposition in both these substances, and the formation of new compounds, at the same time that the latent heat, or caloric, and the light, are separated and are set at liberty. As fire is of great and constant use for economical purposes, no pains have been spared to determine how the greatest effect may be produced in the safest and most economical manner possible, relative to all species of fire, from the burning of the helmet lamp, to that of the most powerful furnace. The combustibles, which are used for all these kinds of fire, are collectively called fuel, and in all cases the difficulty is to determine which kind of fuel is (according to other concurring circumstances of place, expense, &c.) the fittest for any given purpose. The full consideration of these particulars will be found under a variety of articles.
FIRE.

such as FUEL, LAMP, LIGHT, FURNACE, &c.; we shall
nevertheless barely mention in this place some of the lead-
ing facts, which have been determined in consequence of re-
peated experiments, and which may, for the present, fur-
nish the reader with a sufficient idea of the limits within
which our powers of employing fires have as yet been con-
fined.

Half an ounce of spermaceti oil, of the best kind, in a
proper lamp, which is furnished with a wick of a single
thread of cotton, may be made to burn for about twenty
hours, and it seems that no smaller or cheaper quantity of
any other combustible substance is known, which will main-
tain a fire for nearly so long a time. The Chinese use
a very peculiar mode of continuing a small fire. A very light
flick, about a twentieth of an inch in diameter, and about
fourteen inches in length, is crufled over with a fine sort of
faw-duff, wherein perhaps a very small quantity of nitre
may be contained. The faw-duff is probably made to ad-
here to the flick by means of weak glue. If one of these
flicks be crufted and lighted at one extremity, it will con-
tinue to burn, not with a flame, but like tinder, and will
last about a quarter of an hour or twenty minutes. The
Chinese keep such flicks burning before their idols, or for
the purpose of lighting their pipes, even in their boats upon
water; and when one of them is nearly out, another is put
in its place. The flame of a lamp, furnished with spirit of
wine, is much more active than when furnished with oil;
and it is to be remarked that the flame of spirit of wine
gives much more heat, and at the same time much less
light, than the like flame of oil. The flame of burning hy-
grogen gas in common air is not very active, at least
not nearly so active as a similar sized flame from
oil; yet it is said that the flame of hydrogen gas,
urged by pure oxygen gas, produces the most active fire
known. For this experiment the two gases must not be
mixed in a common vessel, and then let out of a small
 aperture in order to be lighted, and to produce a stream of
fire; for in that case the whole quantity of mixed gases
would at once explode, and burn the vessel; but the two
gases should be kept in separate vessels, as, for instance,
in two bladders furnished with stop-cocks, and when the stream of
hydrogen is burning, then the stream of oxygen ought
to be directed towards it. The gas, which is extricated
from coal by means of heat, has been found useful for light-
 ing apartments in certain circumstances, but the particu-
lar precautions will be found detailed under the article EXIIX.

For a culinary, or common fire place, several species of coal fur-
nish, coeteris paribus, the most lasting, and, upon the whole,
the most useful fire. The same will do for large furnaces;
but for small furnaces, wherein a clear fire may be wanted,
or for drying malt, &c. coke or charred coal is preferred;
for the action of charring excels from the coal a good deal
of grofs vapour, which otherwise renders the fire smoky,
especially at first. The greatest heat of an air furnace, eight
inches in diameter, according to Wedgwood's estimation,
amounts to about 21,877° of Fahrenheit's thermometer, or to
160° of Wedgwood's.

From the above-mentioned statements one may be en-
ably led to conceive what degree of credit must be given to those
idle theories of perpetual fires, and of lamps having been
found actually burning in old tombs, and stone coffins.
The improbability, or rather the absurdity of the account,
is so very glaring as to render them only fit for novels and low
poems, and it seems as if we must confine our notice under so many other obvious arti-

bles, as to supersede the necessity of rendering the present
very prolix; there are, however, two particulars, which
may with more propriety be expected in the present;
and therefore we shall briefly join them. These are a short
history of the principal opinions that have been entertain-
ing respecting the nature of fire, and some remarks on the
various leades in which the word fire has been used.

The opinions of the ancient philosophers respecting fire
were various and fanciful. Ignorant of the leading facts
which a theory is required to account for, and unaided
by experiments or tools, they generally made use of words
which convey no definite ideas. They called it an active
fermentation, an inflame motion, a repulsive agent, and
so forth; but no real attempt towards a rational investiga-
tion is to be found in their works. And though some of
their assertions seem to coincide with the more rational mod-
ern theories; yet that a parent coincidence must be con-
sidered as being accidental; for it is not grounded upon my
regular reasoning. It must be acknowledged, however, that
almost all the opinions, either ancient or modern, respecting
fire, may be divided into two classes: for some of them at-
tracted that fire was nothing more than a violent agitation,
in some unknown manner, of the parts of burning bodies,
whilst others attributed it to something peculiar, and sui-
generis which either existed in all combustible bodies, or
was communicated to them. The former, which is called
the mechanical hypothesis, was believed and maintained by
the most able philosophers of much earlier, and much more
enlightened times. Bacon, Boyle, and Newton, were of
that opinion; and there seems to have existed a considera-
bly纠纷 between those differing persons, and some cele-
bated chemists of those times, who maintained that fire
was a fluid of a peculiar nature. The former asserted that
the phenomenon of fire could be accounted for on the suppo-
sition that fire consisted in nothing more than the violent
agitation of the parts of the bodies concerned; but as no
such motion could be produced without an adequate cau-
sed, they were considerably perplexed by it, and, in fact,
their attempts towards an explanation are very confounded.
Boyle says that when a piece of iron becomes hot by hammering,
"there is nothing to make it so, except the forcible motion
of the hammer impressing a vehement and variously deter-
mined agitation on the small parts of the iron." — It is to
be remarked, that the same Mr. Boyle, on observing the
phenomena of the metallic bodies acquiring additional
weight by their calcination, was induced to publish a treat
ise on the possibility of rendering fire and flame ponderable.
Bacon defines heat, (which he considers as meaning the
same thing as fire) to be " an expulsive undulatory motion
in the minute particles of a body, whereby they tend with
some rapidity from a centre towards a circumference, and
at the same time a little upwards." Newton did not at-
tempt to afford any thing positive concerning it; but he con-
jectured that gross bodies and light might be convertible
into one another; and that great bodies of the size of our
earth, when violently heated, might continue and increase
their heat by the mutual action and reaction of their
parts.

The first of the chemists who attempted to form chemis-
try into a regular system, was John Josephus Beccher, but
the famous George Ernest Stahl, (who was born in the
year 1660, and died in the year 1734,) by following
Beccher's plan, continued to raise the science, endeavouring
to collect the principal facts then known into a coherent
system, by connecting them by means of general principles.
This intelligent man, among other improvements, formed
the famous phlogistic theory of fire (see the article Com-

5 BUSTION)
FIRE.

Inflammation, which was almost universally adopted, notwith-standing its insufficiency to account for some of the most essential phenomena of combustion. This theory continued in vogue until towards the close of the last century, when a new theory of chemistry, and a new theory of fire, was announced to the world by the immortal Lavoisier, who unfortunately died in the year 1794. His hypothesis, which he called the combustion theory, was based upon the idea that all forms of matter could be converted into a gaseous state. This hypothesis was supported by experiments conducted in laboratories and in the field. His work was revolutionary, and it was a key moment in the development of chemistry and the understanding of fire.

Since the publication of Lavoisier's hypothesis, or rather established theory, an objection, apparently of importance, has been made to it by Count Rumford, in consequence of some experiments which he made upon friction. This gentleman found, that in boring a cannon during half an hour, the temperature was raised 78°; and that it suffered a loss of 837 grains by the dute and scales torn off, which amounted to 74 per cent of the cylinder. He then, calculating upon the supposition that all the heat so raised was given out by these scales and dute, concludes that they must have lost 663½° of temperature; when at the same time he found that their specific heat was not thereby sensibly diminished. This observation made him doubt the existence of the calorific propelled by Lavoisier, as a principle in the universe, &c. and prompted him to make certain unwarrantable queries respecting the nature of fire; but he omitted to notice a very material circumstance; namely, the compression which the whole piece of metal suffered in consequence of the boring; hence Mr. Dalton justly says, "the heat excited does not arise from the scales merely, else how should hammering make a body red-hot without any loss of scales?" The fact is, the whole mass of metal is more or less condensed by the violence used in boring, and a rise of temperature of 70°, or 100°, is too small to produce a sensible diminution in its capacity for heat. Does Count Rumford suppose, that if in this case the quantity of metal operated upon had been one pound, and the dute produced the same as above, that the whole quantity of heat evolved would have been the same? The word fire has also been used both figuratively and incorrectly. The allegorical expressions of the fire of the imagination, the fire of youth, the fire of contention, and so forth, do not fall under the cognizance of natural philosophy; but the scientific use of that word for expressing heat without light, or light without heat, or fire, things which have neither heat nor light, is in want of correction. Thus phlogisticaceous substances, like certain pieces of decayed wood, fat, etc. are frequently said to be on fire; whereas they are not attended with any degree of heat. Also the heat of fermenting substances, and of other kinds of chemical combinations, has often been called fire. But the most singular use of that word is its being often employed for expressing the electric fluid, which in its quietest state has neither heat nor light. It is true that in a vast number of electrical experiments fire is actually produced, and every electric spark is capable of setting fire to certain inflammable bodies. A very small spark of electricity, such as indeed may appear not bigger than a pin's head, is sufficient to inflame hydrogen gas. But it must be considered that the effects of fire take place only when the electric fluid is obliged to pass through certain substances which in some measure obstruct its free motion. A Leyden phial fully charged with electricity, and left unsealed, does not show the least perceptible mark of light or of heat, more than a similar phial not charged with electricity. Let the charged
of the goddess Vesta (or Vesta) and of fire was brought
into Italy by ~Neus and the other Trojans, who landed
there, but the Phrygians themselves had received it from
the eastern nations. Fire was held in religious veneration
among the Gauls; and similar sentiments and practice have
prevailed in several countries of America.

The Hebrews kept up the holy fire in the temple. This
holy fire descended from heaven, sittl upon the altar in the
tabernacle at the consecration of Aaron and his sons to
the priesthood, Lev. x. 24, and afterwards it descended
anew on the altar in the temple of Solomon, at the consecra-
tion of that temple, 2 Chron. v. 1. And there it was con-
stantly maintained by the priest day and night, without suf-
fcring it ever to go out; and with this all the sacrileges were
offered that required fire. This fire, according to some of
the Jewish writers, was extinguished in the days of Manasseh;
but the more general opinion among them, is, that it con-
tinued till the destruction of the temple by the Chaldeans;
after that it was never more restored; but instead of it they
had only common fire in the second temple.

The Vejials were appointed expressly to keep up the
sacred fire of the Romans. See VESTALS.

Vulcan was worshiped among the ancients, and partic-
ularly the Egyptians, as the inventor of fire; and Boerhaave
has made it highly probable, that the Viking of the he-
thens was the Tubal-Cain of the Hebrews, the first who ap-
ppears to have known the use of fire, and to have applied it
in the fusion of metals and other preparations of chemistry.
See PROMETHEUS.

FIRE, Divination by. See PYROMANCY.

FIRE, in the Manege. To give the fire to a horse is to
apply the firing-iron red-hot to some preternatural dwelling
in order to disfus it, which is oftentimes done by clapping
the firing-iron upon the skin without piercing through.
We give the fire to farcy knots, by running a pointed burn-
ing iron into the ules. We likewise give the fire for
wrenches of the patterns. See Firing-iron.

FIRE, in the Military Language, is sometimes applied to
the fires lighted in an army in the night-time.

But the term fire or firing is more frequently used for the
discharge of the fire-arms, or the shot made on the enemy
from the artillery, &c. And accordingly it is used as a word of command to soldiers of all denominations to
discharge their fire-arms, grenades, cannon, &c. The
fire of the infantry is by a regular discharge of their
fire-locks, by plateaus, divisions, &c. that of the ca-
vahry with their fueves and pistols; and that of the
place besieged from their artillery. See Exercise and
Firing.

In fortification, the fire of the place denotes the flank, or
that part of the curtain where the line of defence terminates
from whence they fire to defend the opposite face of the
battlements.

FIRE-ARMS, a term attaching to all weapons, principally
of an offensive nature, from which bullets, &c. may be im-
pelled by the force of gun-powder. There are generally
divided into two species, the one requiring much labour to
transport, and known by the names of artillery, ordnance,
cannon, great-guns, &c. and again subdivided into calibres,
such as the mortar, the howitzer, the culverin, the demi-
culverin, the royal, &c. &c.; the other species are made on
a portable principle, and comprise those implements com-
monly called muskets, carbines, match-locks, arque-
bulles, blunderbusses, fullets, together with pistols of var-
ious sizes and descriptions; forming in the whole an ample
catalogue of inventions limited to enabling the human race
not only to defend itself against beasts of prey, and to attain
provisions from among the several inhabitants of the earth,
the air, or the waters, but to destroy each other whole-
fale; as though we were afraid that our increasing population
should ultimately condemn us either to starvation, or to
revert to the most horrid means of supporting existence, viz.
Cannibalism.

In treating of ARTILLERY, we have already explained the
nature of ordinance in general, and shewn the proportions
severally of the different natures, as the various sizes are
technically called; therefore, in this place our attention
will be chiefly directed towards those matters relating to
fire arms in general; by which we mean to be understood
as applying to that term to those lighter weapons popularly called
"small-arms."

The several nations of Europe, among which the arts
have made such rapid progress, have long since banished the
more rude and uncertain mode of igniting the powder in
the priming pan by means of a match, which being formed of
some substance that retains fire, but burns very slowly,
could merely, by the motion of a small lever, acted upon by
a finger, he applied thereto. This method is, however,
very generally retained among the nations of the East; where
the bark of the prunus, an indigenous tree every where
abounding, supphes the palolet, or match, in very great
perfection; merely by causing the threads stripped off from
the leffer branches to be beaten with a heavy iron mall, or
hammer, in the course of its drying, which it does in a few
days; the fibres are then twisted to about the thickness of a
fawn's quill, and to any length that may be judged necessary;
the spare part being allowed to hang down at the side of the
lock, or lever. The use of matches is not only attended with
great delay, but, in consequence of the multiplicity which
exists before applying it to the pan, ball, and, in many instances, subject the operator to danger,
or eventually to accidental contact, between the sparks and
the firing.

Match-locks, such as are in Hindoostan, which, including
China and Tartary, may be considered their head-quarters,
are not applied to the shoulder when about to be discharged;
but having a long fock, of a batten-form, are placed under
the arm. This takes off the recoil; or rather causes it
not to be felt; an object of some importance when it is
known that these pieces are generally charged heavily; and,
that on account of the scarcity of lead, malleated iron balls
are in general use: these, being very rough, require to be
rammed down very hard, otherwise they would remain in
the upper part of the bore, and subject the barrel to be
burr'd, as very frequently happens in consequence of the im-
perfection of the balls makes in its course through a long
bore, every where presenting an unfinished surface. On
the other hand it is to be remarked, that match-locks
throw balls to great distances, and, owing to the deliberate
manner in which they may be discharged, without any tug
at a flint trigger, or the fear of a kick from the butt, are
found to do immense execution; most of those persons who
use them are, indeed, as expert as the generality of rifle-men.
Many of these pieces are so long and heavy, as to require
moveable reels: tho' mounted as wall pieces, and called jin-
jauls, often throwing a ball near a mile, and weighing from
fifty to sixty pounds.

The muskets in use among the armies in Europe are far
more compact, carrying a larger ball, and in every respect
better finnished. These are provided with spring-locks,
which impel the flint towards a steel plate, called the hammer,
by which the spars are directed into the pan. It is
to be regretted that the flint usually provided for our mili-
tary are not of a better quality; so as to infure their striking
fire
FIRE.

Fire with greater certainty. Our fire-locks are indeed far too heavy, for which it is assigned as a reason, that lighter pieces would not send the balls to a sufficient distance; but if we consider the well ascertained fact, that not one musket ball in an hundred strikes upon an opposing line of troops, we certainly should set our minds rather more at ease, on the score of impetus in a weapon so very little contributing to the success of the day. It may not be too much to assert, that the decrease of weight, whereby fatigue and labour would be greatly lessened, would enable our brave foikers to act with greater promptitude in general, and to use their bayonets, which are really efficient in their hands, with more activity and vigour.

English fire-arms of every kind are made to the greatest perfection; their bores being perfectly smooth, and the locks remarkably neat, strong, and active. The sizes of the balls are all regulated when for public service; being cast in moulds of particular diameters; so that no mistake can be made, malefactors through shameful neglect, in supplying ammunition to the several corps. The British standard is as follows:

<table>
<thead>
<tr>
<th>Nature of the Piece</th>
<th>Number of Balls to one Pound of Lead</th>
<th>Diameter of each Ball in Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wall Pieces</td>
<td>6 1/2</td>
<td>.89</td>
</tr>
<tr>
<td>Muskets</td>
<td>14 1/2</td>
<td>.68</td>
</tr>
<tr>
<td>Carabines</td>
<td>20</td>
<td>.60</td>
</tr>
<tr>
<td>Pitols</td>
<td>34</td>
<td>.51</td>
</tr>
<tr>
<td>7 Barrel Guns</td>
<td>46 1/2</td>
<td>.46</td>
</tr>
</tbody>
</table>

In order to preserve a regularity in the supply of balls for pieces not on any regular scale, or establishment, it is usual to ascertain what ball will fit the bore in a proper manner, so as to allow of four folds of paper, (i.e. two on each side,) necessary to wind around the ball when made into a cartridge. The ball is then tried in a gauge, that is, a bar pierced with holes, all declining in size, in regular order, and numbered from one, which fits a wall-piece, to buck-shot; which is ordinarily estimated at about No. 32 or 32. Whatever hole the ball may pass through, but in so close a manner, as to flop in the next smaller hole, gives the designation of the bore on the registrar. But it is more usual to cast balls in moulds, designated according to the number of balls of that size made from a pound of lead. Therefore musket balls would be called No. 14, and carabine balls No. 20.

The mention of seven-barrelled-guns leads us to contemplate, with no slight admiration, the perfection to which this branch of mechanism has been brought! This perfection has naturally been produced by successive stages, each of which has had numerous candidates, to whom public liberality has been the inducement, and proved the reward. When we consider that a man provided with a musket having seven barrels, yet but one lock, may discharge seven times in less than half a minute, without any intermediate operations of priming or loading, we must yield our tribute of applause to the ingenuity of the inventor, though we cannot refrain from reflecting on that purpose to which it is devoted.

As to pistols, &c. they are made upon various scales, and for the particular purposes of those who are to use them. Thus, what we call horse-pistols, are intended to occupy the holsters attached to saddles; duelling-pistols, which are usually provided with hair-trigger, that act upon the slightest touch, are defined to the decision of those knotty points at which honour so speedily takes umbrage; while the pocket-pistol, made upon a diminutive scale, may be intended either for the use of the robber, or to repel his presumption. Whatever may be the purpose of fire-arms, whether for the military, for sporting, or for general defence, nothing can be more improper than leaving them loaded in places accessible to servants, strangers, and especially to children. We should suppose that the immense number of accidents that happen, and are publicly notified in the daily prints, might operate as a stimulus towards the secularising of fire-arms, beyond those ordinary means of accessibility, which place them within the reach of every one whose ill-fated curiosity may induce to handle them. Strange to say! we shudder at the detail of one of those accidental murders which too often occur, yet neglect to benefit by the melancholy lesson, until some domestic calamity of the same nature may burthen the negligent proprietor with shame, affliction, and remorse.

Fire-arrow is a small iron dart furnished with springs and bars, together with a match impregnated in powder and sulphur, which is wound about its shaft. It is used by privateers and pirates to fire the tails of the enemy, and for this purpose is discharged from a musket or a swivel-gun. The match being kindled by the explosion, communicates the flame to the tail, against which it is directed, where the arrow is softened by means of its bars and springs. This is peculiar to hot climates, particularly the West Indies, the arrows being extremely dry, are instantly set on fire, and the fire is conveyed to the masts, rigging, and finally to the vehicle itself.

Fire-ball, a composition of meal-powder, sulphur, salt-petre, robin, pitch, &c. about the bigness of a hand-grenade, made of an iron fleet, filled and covered over with several coats of the above mixture, the last coat being of ground powder. Thick brown paper made into the form of a shell adapted to the size of the mortar, and filled with an equal quantity of sulphur, pitch, robin, and meal powder, well mixed and put in warm, will answer the purpose as well as any thing else. This is to be thrown into the enemy's works in the night-time, to discover where they are; or to fire houfes, galleries, or blinds of the besiegers. The balls used for this intention are prepared with meal powder, salt-petre, sulphur, robin, steel or iron filings, fir-tree sawdust boiled in salt-petre ley, and birchwood charcoal, well rammed into a shell, having various holes filled with small barrels, loaded with musket-balls, and immered in melted pitch, robin, and turpentine oil. They are sometimes armed with spikes or hooks of iron, that they may not roll off, but flick or hang where they are desired to have any effect. See Balls.

Fire-barc, in our Old Writers, is used for a beacon. "Quod fine dilatatione levari & reparari facigna & firebars, super montes altiores in quolibet hundreds, jam quod tota patria per illumigna, quondam unicum hunc aerifum prae- munire potest." Ordin. Observand. Temp. Edw. II.

Fire-barrels, See Barrels, and Fire-flips.

Fire-blight, a disease or accident to which the hop plant is much exposed. It chiefly occurs towards the latter periods of the growth of the crops. It is suppoft by most hop-planters to depend upon the particular state of the air or weather at the time; but it is more probable that it may be caused by lightning, as it takes place very suddenly at those seasons when it most prevails, and generally affects the most forward and luxuriant plants. See Hops.

Fire, bon. M. Mahudel has a dissertation on the origin of bon-tires, wherein he endeavours to make it appear that they were unknown to the ancients, and consequently must be a modern invention.
FIRE.

He does not deny that the ancients had rejoicings on occasion of the conclusion of a peace or alliance, or the news of a victory's being obtained against their enemies; on the birthday, proclamation, or marriage of their prince; as also when they recovered from a dangerous sickness; but, according to him, the fire on all these occasions served only to burn the victims or the sacrifices; and as these sacrifices were usually offered in the night-time, the illuminations were only intended to give light to perform the ceremonies.


Fire-works, a term signifying a quantity of wood bound up for fuel, which, by the common law, the tenants may, for necessity, take out of the lands that have been granted to them.

Fire-clay, is that particular kind of clay which is proper for making bricks or tiles intended to stand a high degree of heat. The third kind is made of argilaceous clay, between the third and fourth grit rock, reckoning from the mill-wood grit upwards, which travels Derbyshire and part of Yorkshire, and produces heart-fine and foidite in great abundance, contains a very excellent fire-clay, which is dug at Heazle-nether-end, Whicker, Dickin Lane, and other places. The fillings of the fourth or lower strata of this district sometimes produce admirably maffes of fire-clay, of good quality, as at Mill Hill gate, near Water-loo, Staffordshire, and near New-haven, Derbyshire.

It is found that clay, more or less fit for fire-bricks, is found immediately beneath almost every seam of coal, and where it is not felt in the form of clay, the chine and other indurated substances composing the immediate floor of coal, will generally fall by exposure to the weather, into a brick clay or earth. See Floor.

Fire-cocks. Churchwardens in London, and within the bills of mortality, are to fix fire-cocks at proper distances in streets, and written marks near them, and to keep in every house thus marked an instrument or key for opening the plug, and a large engine and hand-engine for extinguishing fire, under the penalty of $10. The turn-cock whole water shall come first into a main-pipe at a fire, shall have 102. the first engine that is brought shall entitle to 32d. the second to 20s. and the third to 10s. 6d. Ann. cap. 31. 12 Geo. III. cap. 73. To prevent fires, it is required that workmen in the city of London, &c. build all front and rear walls of brick or stone; and that the front walls be 18 inches above the gutter, and coped with stone, tile, or brick; and party-walls between house and houses, those belonging to houses, the expense of building which is more than 120. to be of the thickness of 1 foot nine inches, or 2½ bricks in the lowest story; and of 2 bricks, or 1 foot 6 inches from thence to the garret floor; and from the garret upwards 1 brick, or 13 inches, and to be carried up to the full height of 18 inches above the adjoining gutters; and it is also required, that no timbers, except the girders, binding and tying joints, and the tempels under the same, shall be laid into such party-walls; and that there shall be 5 inches of solid brick-work laid left at or between the ends of all lintels, wall-plates, and bond timbers. See Building, and lat. 7 Am. c. 17. 11 Geo. i. c. 28. 33 Geo. ii. cap. 50. and 4 Geo. iii. cap. 144. And on the breaking out of any fire, all the contained and liberties shall repair to the place with their lances, and be affilling in putting out the same, and causing people to work, &c. No action shall be had against any person in whose house or chamber a fire shall begin, 6 Am. 10 Am. c. 14. But if such fire happens through negligence of any servant, such servant shall forfeit 10s. to be distributed among the sufferers; or, in default of payment, shall be committed to some work-house, and there kept to hard labour for eighteen months. See Arson.

All the laws relating to the prevention, &c. of fire, are reduced into one statute, and former statutes repealed, by 12 Geo. III. cap. 73.

FIRE-damp, in Natural History. See DAMP.

Fire-breakers. We have a great number of mountebanks who have procured the attention and wonder of the public by eating of fire, walking on fire, washing their hands in melted lead, and the like tricks.

The most celebrated of these was one countryman Richardson, much talked of abroad. His secret, as related in the Journals des Sciences of the year 1780, consisted in a pure spirit of sulphur, wherewith he rubbed his hands and the parts that were to touch the fire, which burning and captivating the epidermis, hardened and enabled the skin to refill the fire.

Indeed this is no new thing; Am. Paré affirms he had tried on himself, that after washing the hands in urine, and with unicorn's urine, one may safely wash them with melted lead.

He adds also, that by washing his hands in the juice of onions, he could bear a hot shovel on them while it melted hard.

Fire, Electrical. See Electricity.

Fire-engine, is a machine for extinguishing accidental fires by means of a stream of jet of water. The common fire-engine consists of a lifting pump placed in a circular or cylindrical vessel of water, and brought by two levers that act always together. During the stroke, the quantity of water raised by the piston of the pump spouts with force through a pipe joined to the pump-barrel, and made capable of any degree of elevation by means of a yielding leather pipe, or by a ball and socket turning every way, screwed on the top of the pump. The vessel containing the water is covered with a strainer, which prevents the dirt and filth poured into it with the water from choking the pump-work. Between the strokes of this engine the stream is discontinued for want of an air-vessel. However, in some cases, engines of this confection have their use, because the stream, though interrupted, is much finer than when the engine is made to throw water in a constant stream. The ball engine of this latter kind is that of Mr. Newsham, formerly an engine-maker in London. A perspective view of the whole engine, ready for working, is represented in Plate III. Hydraulics, &c. fig. 4.

This engine consists of a cylinder A B, about three times as long as it is broad, made of thick oak planks, the joints of which are lined with sheet-copper, and easily moveable by means of a pole and cross bars C in the fore part of the engine, which is so contrived as to slide back under the cover of the cylinder, and on four fold wheels, two of which are seen at D and E. The hind axle-tree, to which the wheel D and its opposite are fixed, are fattened across under the bottom of the cylinder; but the fore axle-tree, bearing the wheel D, &c. is put on a strong pin or bolt, strongly fattened in a horizontal situation in the middle of the front of the bottom of the cylinder, by which contrivance the two fore wheels and the axle-tree have a circular motion round the bolt, so that the engine may stand as firm on rough or sloping ground as if it was level. Upon the ground next to the hind part of the engine may be seen a leather pipe F, one end of which may be screwed on and off upon occasion to a brass cock at the lower end of the cylinder: the other end is immered in the water, supplied by a poad, fire-plug, &c. and the pipe becomes a sucking pipe for furnishing
the pumps of the engine by its working, without pouring water into the cistern. To the hind part of the cistern is fastened a wooden trough G, with a copper grate for keeping out stones, sand, and dirt, through which the cistern is supplied with water when the sucking pipe cannot be used. The fore part of the cistern is also separated from the rest of its cavity by another copper grate, through which water may be poured into the cistern. Those that work the pumps of this engine move the handles visible at the long sides, up and down, and are assisted by others who stand on two suspended trestles, throwing their weight alternately on each of them, and keeping themselves steady by taking hold of two horizontal rails, H, I, framed into four vertical stanchions, which reach to the bottom of the cistern, and are well secured to its sides. The hind trough there is an iron handle or key K, serving to open or shut a cock placed under it on the bottom of the cistern, the use of which we shall explain in the sequel of this article.

L is an inverted pyramidal box or cafe which preserves the pumps and air-veils from damage, and also supports a wooden frame M, on which stands a man, who, by grading or depressing, and turning about the spout N, directs the stream of water as occasion requires. This spout is made of two pieces of brass pipe, each of which has an elbow; the lower is screwed over the upper end T (see fig. 5) of the pipe that goes through the air-veil, and the upper part forms a joint, which, after a screw of several threads, is so truly turned as to be water-tight in every situation. The narrow form of the spouting-pipe serves for wire-drawing the water in its passage through it, which occasions a friction that produces such a velocity of the jet as to render it capable of breaking windows, &c. whilst the valves and-leathern pipes of the engine have sufficient water-way to supply the jet in its greatest velocity. Leather pipes of considerable length may be screwed at one end of the nozzle of the engine, and furnished at the other end with a wooden or brass pipe for guiding the water into the inner apartments of houses, &c. Between the pyramidal box L, and the fore-end of the engine, there is a strong iron bar O, lying in a horizontal position over the middle of the cistern, and playing in braces supported by two wooden flanks; one of which, P, is placed between the two fore-flanks of the upper rails, and the other is hid in the enclosure over the hind part. Upon proper spigots of these bars are fitted, one near each end, two strong hose bars, which take hold of the long wooden cylindrical handles, by means of which the engine is worked; and the trestles by which they are affixed are suspended at each end by chains in the form of a watch chain, and receive their motion jointly with the handles that are on the same side, by means of two circular sectors of iron fastened together, and fixed upon proper spigots of the middle horizontal bar; the two fore ones may be seen at Q; the two hind ones represented on a large scale in fig. 6 differ from the former only in thickness; for the fore sectors are made to carry only one chain each, fastened by one end to their upper part, and by the lower end to the trestles; whereas the pole of the two hind sectors is wide enough to carry two chains each; one end fastened like those of the fore ones for the motion of the trestles; and the other two chains are fastened by their lower ends to the lower part of these sectors, and by their upper ends to the top of the pinion bars, in order to give them motion. See fig. 6, in which the hind sectors and their apparatus are represented as they would appear to a person standing between the two fore-wheels, and looking at the hind part of the engine. The square over the letter A is the section of the middle bar, on which, right over the two barrels, are placed the two sectors BCA and DEA, forged together. E G H K and J  6 are the two pinion rods; and the openings between the letters G, H, and J, &c., are the spaces through which the hind parts of the two trestles pass. L and M represent two strong, and rivetted on the other side of the bars on which they are placed; and to each of these is fastened a chain like a watch-chain, fixed by their upper ends to the upper extremities D and B of the iron sectors, by which they are drawn up and down alternately. These sectors give also an alternate motion up and down to the pinion-rods, by means of two other chains that rise below the figure, in order to distinguish them from the others; these are fastened by their lower ends to the lower extremities of the sectors E and C, and their upper ends terminating in a male screw, are made tight to the pinion-rods at I and J, by two nuts. The shape of the pinion-rods, and the use and situation of the chains that give them motion, are so contrived, that the vertical axis of the pinions is exactly in the middle of the breadth of the perpendicular part of the chains, and the upper part of the pinion-rod taken together P Q represents one of the two crofs bars through the ends of which pass the long handles to which the men apply their hands when they work the engine; these crofs bars are fitted on the middle bar at some distance from the sectors.

The other parts of this useful engine may be understood by the help of fig. 5, which represents a vertical section taken through the middle line of the hind part of the engine, as also the section of the air-veil, and that of one of the barrels, and likewise the profiles of the hind sectors, and of several other parts. A B is the section of the bottom of the cistern, and C that of the Lindsmith axle-tree. D E is the vertical section of a strong piece of cast brass or hard metal, so worked as to have a hollow in it, represented by the white part, and fixed to the bottom of the cistern; this reaches from the opening D through the cock W, and afterwards divides itself into two branches, so as to open under the two barrels; one of these branches is exhibited in the figure, and the other is exactly behind this. Through this channel, which may be called the sucking-piece, water is conveyed to the pumps by the pressure of the atmosphere, either from the cistern itself, or from any place at a distance, by means of a leathern pipe F, fig. 7, which screws on to the sucking-piece at D, fig. 5, under the hind trough Z, the grate of which is represented by the horizontal strokes. F G represents the vertical section of another piece of cast brass or hard metal that may be called the communicating-piece, having two hollows for conveying the water from under the two pinions to the two openings of the flanch of the air-veil; one of these hollows appears in the figure; the other lies exactly behind this, though not in a parallel direction. Between the section of the sucking-piece D E, and that of the communication-piece F G, may be observed the section of one of the plates of leather, which makes all tight, and forms one of the two sucking valves, of which there is another just behind this under the other barrel. R S T is the section of the copper air-veil, and T V that of the conduit-pipe; this veil is pierced on to the hind part of the communication-piece, and at top is fastened by a collar of iron to a crofs piece of timber. Between the flanch of the air-veil and the communication-piece may be observed the section of one of the plates of leather, making all tight, and forming one of the two forcing valves, of which there is another just behind this, exactly over the other opening of the communication from the air-veil. These valves are located.
with a lump of cast iron or lead, having a tail or teat let through the flap of the valve and cros-s-pinned under it; and it is to be observed, that though both the valves are represented open in the figure, they are never both open at the same time; for when the engine is at work, they are closed down by the weights on their upper surfaces; and when the engine works, two are shut, and the other two are open alternately by the motion of the pistons and the action of the atmosphere, together with the reaction of the air contained in the air-vessel. \( H \) is the section of one of the barrels of the two pumps, which are both fucking and forcing, as is evident from the position of the valves and the structure of the pistons, each of which is composed of two iron plates, of two wooden treceners, and of two flat pieces of leather turning one up and the other down. \( L K \) represents one of the piston-rods edge-wise, behind which is one of the chains, the top screw of which, \( K \), can only be seen. \( M \) is the end of the middle bar, and \( N \) a section of the hind-mold of the two middle-stands which support the middle bar. \( O \) represents the end of the profile of one of the treceners, passing through the rectangle-shaped holes of the piston-rods, as in fig. 8. The weights on these treceners bring them and the piston-rods down alternately, and they are raised up again by help of the other set of chains, one of which may be seen edge-wise in this figure, placed on the side of one of the factors, &c. See fig. 6.

\( P Q \) is part of the cross bars which carry the handles of the edge-wise, and \( X Y \) represents an iron handle, by the help of which the cock \( W \) may be placed in the several situations requisite for the use of the engine. The mechanism of the cock \( W \) may be understood by figs. 9, 10, and 11, which represent the horizontal section of it in three different situations. It has three holes that are left white in these figures. In fig. 9, the position of the cock is represented when the handle \( X Y \) or \( K \) is in a direction parallel to \( D E \), or to the middle bar, as in fig. 5, and fig. 4. In this position, the water supplied by the fucking-piece enters at \( D \), and proceeds directly through the cock \( W \) to the valve under the two pistons; and there is now no communication from the barrels with the cavity of the cistern. In fig. 10, we have the position of the cock when the handle \( X Y \) is turned one quarter of a revolution towards the eye from the last mentioned situation, in which case there is no communication from the barrels with the outer extremity of the fucking-piece, but the water poured into the fore and hind trough, and passing from thence into the cavity of the cistern, enters the cock edge-wise at \( W \), and, turning at right angles through the cock towards \( E \), proceeds to the barrels of the pumps. Fig. 11, represents the cock \( W \) when the handle is placed diametrically opposite to its last situation, in which case there is no communication from the under-side of the barrels with the cavity of the cistern or the outward end of the fucking-piece; but this situation affords a communication from the cavity of the cistern with the outside of the engine, and the water left in the cavity of the cistern may by this means be employed when the engine has done working. These engines are made of five or six different sizes. See Defaguer's Course of Expnr. Philos. vol. ii. p. 505—518.

The principles on which this engine acts, so as to produce a continued stream, are obvious; the water, being driven into the air-vessel, as in the operation of common fucking and forcing pumps, will comprize the air contained in it, and proportionably increase its spring, since the force of the air's spring will always be in inverse as the space which it possesses; therefore, when the air-vessel is half filled with water, the spring of the included air, which in its original state is counterbalanced by the pressure of the atmosphere, being now compressed into half the space, will be equal to twice the pressure of the atmosphere; and by its action on the subjacent water will cause it to rise through the conduit-pipe, and to play a jet of 32 or 33 feet high, abating the effect of friction. When the air-vessel is two-thirds full of water, the space which the air occupies is only one-third of its first space; therefore its spring being three times as great as that of the common air, will project the water with twice the force of the atmosphere, or to the height of 64 or 66 feet. In the same manner, when the air-vessel is three-fourths full of water, the air will be compressed into one-fourth of its original space, and cause the water to ascend in air with the force of three atmospheres, or to the height of 96 or 99 feet, &c. as in the following table:

<table>
<thead>
<tr>
<th>Height of the water.</th>
<th>Height of the compressed air.</th>
<th>Proportion of the air's spring.</th>
<th>Height to which the water will rise.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>3</td>
<td>66</td>
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<tr>
<td>4</td>
<td>1</td>
<td>4</td>
<td>99</td>
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<tr>
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<td>5</td>
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<td>1</td>
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<td>1</td>
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<td>8</td>
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<td>1</td>
<td>9</td>
<td>358</td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>10</td>
<td>297</td>
</tr>
</tbody>
</table>


The fire engine, by Rowntree, is a double-forece pump, of a peculiar construction, similar in its action to the beard-engine, but as it is on a much larger scale, its constructions are of course varied. In this engine, figs. 1, and 2.

Plate IV. Hydraulics, are two elevations at right angles to each other, of the external part of the engine mounted on four wheels. Figs. 3. and 4. are two sections perpendicular to each other, of the body of the engine or pump; figs. 5. and 6. are parts of the engine. The fame letters are used as far as they apply in all the figures, \( A, A, A \); \( A \); figs. 3. and 4. is a cast-iron cylinder truly bored, ten inches diameter and fifteen long, and having a flanch at each end whereby to screw two covers, with flushing boxes, \( a, a \), in their centres, through which the spindle, \( B, B \), of the engine palfes, and being tight packed with hemp round the collar, makes a tight joint; the piston, \( D \), is affixed to the spindle within the cylinder, and fits it tight all round by means of leathers; at \( E, A, B \); fig. 4, a partition, called a faddle, is fixed in the cylinder, and fits against the back of the spindle tight by a leather.

We have now a cylinder divided by the faddle, \( E \), and piston, into two parts, whose capacity can be increased and diminished by moving the piston, with proper passagies and valves to bring and convey away the water; this will form a pump. These passagies are caue in one piece with the cylinder; one, \( d \), for bringing the water is square, and extends about 34 round the cylinder; it connects at bottom with a pipe, \( e \); at its two upper ends it opens into two large chambers, \( f, g \), extending near the whole length of the cylinder, and closed by covers, \( h, k \); screwed on; \( i, k \), are square openings (shown by dotted squares in fig. 3.), in the cylinder communicating with the chambers; \( f, h, m \), are two valves, closing their ends of the curved passage, \( d \), and preventing any

water
water returning down the passage, \( d \), \( n, o \), are two passages from the top of the cylinder to convey away the water; they come out in the top of the cylinder, which, together with the top of the chambers, \( f, g \), form a large flat surface, and are covered by two valves, \( p, q \), to retain the water which has passed through them. A chamber, \( K \), is screwed over these valves, and has the air-vessel, \( k, \) fig. 1. and 2. screwed into its top; from each side of this chamber a pipe, \( r, r, \) proceeds, to which a hole is screwed, as shown in fig. 1. Levers, \( x, x, \) are fixed to the spindle of each end, as shown in fig. 1, and carry the handles, \( H, H, \) by which men work the engine. When the piston moves, as shown by the arrow in fig. 4, it produces a vacuum in chamber, \( f, \) and that part of the cylinder contiguous to it; the water in the pipe, \( e, \) then opens the valve, \( m, \) and fills the cylinder. The same motion forces the water contained in the other part of the cylinder through the valve, \( q, \) into chamber, \( K, \) and thence to the hole through the pipe, \( r, \) the piston being turned the other way, reverses the operation with respect to the valves, though it continues the same in itself. The pipe, \( e, \) is screwed by a flanich to an upright pipe, \( P, \) fig. 5, connected with another square iron pipe, fastened along the bottom of the chest of the engine; a curved brass tube, \( G, \) comes from this pipe through the end of the chest, and is cut into a screw to fit on the suction hole when it can be used; at other times a close cap is screwed on, and another brass cap at \( H, \) within the chest, is screwed upwards on its socket, to open several small holes made in it, and allow the water to enter the pipe; in this case the engine chest must be kept full of water by buckets. The valves are made of brass, and turn upon hinges. The principal advantage of the engine is the facility with which it is cleaned from any sand, gravel, or other obstructions, which a fire-engine will always gather when in use.

The chambers, \( f, g, \) being so large, allow sufficient room to lodge a greater quantity of dirt than is likely to be accumulated in the use of the engine at any one fire, and if any of it accidentally falls into the cylinder, it is gently lifted out again into the chambers by the piston, without being any obstruction to its motion; to clear the engine from the dirt, two circular plates, \( r, r, \) five inches diameter, are screwed from the lids, \( b, b, \) of the chambers, \( f, g, \), and when cleaned are screwed on again; these screw covers fit perfectly tight without leather, and can be taken out, the engine cleared, and enclosed again in a very short time, even when the engine is in use, if found necessary.

The two upper valves, \( p, q, \) and chamber, \( K, \) can also be cleared with equal ease, by screwing out the air-vessel, \( k, \) fig. 1, which opens an aperture of five inches, and fits airtight, without leather, when closed. The valves may be repaired through the flame aperture. The use of the air-vessel, \( k, \) fig. 1 and 2, is to equalize the jet from the engine during the short intermittence of motion at the return of the piston stroke; this it does by the efficacy of the compressed air within it, which forces the water out continually, though not supplied quite regularly from the engine.

The engine from which our drawing was taken was made for the Sun Fire Insurance Company, in London, and from some experiments made by their agent, Mr. Samuel Hubert, appears to answer every purpose.

Fire-engine is also a name frequently given to a machine for raising water by steam, more properly called steam-engine, which see.

Fire-escape, a machine for escaping from windows when houses are on fire. Various machines of this kind have been invented by different persons; the following seems to be well adapted to the purpose for which it was designed. It was originally invented by the late John Daniel Massey, esq., and B. M. Potter, esq., has communicated to the public a description of it, with some improvements by himself, in the Philosophical Magazine. The principal parts of this machine, which is called the "flying fire-escape," are as follows:

1. The suspension iron \( A, \) (Plate XII. Miscellany, fig. 12.), which is formed like a ram-head commonly used for slinging goods from warehouses, with this difference, the bottom hooks are turned up close to the upright part, to form two close rings or eyes; the length of this iron is about four inches and a half, thickness of the iron out of which it is hammered is about half an inch.

2. The rope \( B. \) This is made of flax, and plaited in a peculiar manner, for which there was a patent taken out. It is held by Armstrong, St. John's-square, Clerkenwell, and measures about three-eighths of an inch in diameter. The rope must be in length somewhat more than twice the height of the window from the ground.

3. The regulator \( C. \) This is an oblong piece of beech wood, six inches and a half in length, three inches and a quarter broad, and about seven-eighths of an inch thick; in this there are four holes pierced for the rope to pass through; one of these is open at the side; there is also a notch at the top of this piece of wood, and an oblong hole about seven-eighths of an inch from the bottom.

4. The upper belt \( D. \) is a stout leather strap, about four feet three inches long, and one and a half broad, with a buckle to it.

5. The lower belt \( E. \) is a strap of the same sort as the other; but the end, after being put through the buckle, is lowered down: this is for the purpose of security, in case the tongue of the buckle should by accident break.

6. The union strap \( F. \) is called from its connecting the regulator to the other parts of the machine. This is leather, and is about a foot and a half long, and an inch and a quarter broad; it has, like the others, a buckle to it. It is flaxen black, which distinguishes it from the other leather straps.

The method of putting together all these parts of the machine is, first to pass one end of the rope through the holes in the regulator, then through the two lower rings of the suspension iron; the upper belt is then to be passed through a doubling of the union strap; after which the rope is to be tied to that belt, and the knot secured by a string from flipping (which string is to pass through two small holes in the leather); and at about a foot below the rope is to be tied to the lower belt in like manner. Next, the union strap is to be put through the oblong hole in the regulator, and buckled; by which the upper belt and the regulator will be connected. The other end of the rope may be kept wound on a wooden roller, to prevent it from getting entangled.

Persons who purchase these machines should have a very strong iron hook, with a spring catch, fixed to some secure part of the window-frame, or elsewhere; on this hook the suspension iron is to be hung by the upper ring, when any one wishes to descend from the window. The next operation is to step into the lower belt with both feet, and draw it up sufficiently high, so as to form a kind of swing to fit in: the part of the strap which is through the buckle is to be held hold of with the left hand; and the buckle, with the right hand, is to be flint to its proper place, according to the size of the person; the tongue is then to be put into one of the holes, as in buckshag common straps. After this is done, the upper belt is to be somewhat loosely buckled round the chest, and then the rope which is on the roller is to be thrown out over the window on the ground.
Now all being ready for descending, the person is to get out of the window, grasping tight with one or both hands, the rope at some convenient part, taking especial care not to meddle with the suspension iron until quite out of the window; after which the rope below the regulator is to be laid hold of with the right hand, and to be let to run through the holes as fast as there may be occasion; for which purpose, if necessary, it may be easily flipped out of the open hole; it will then have the check of only three holes: if the motion is wanted to be retarded, the rope is to be put into the notch at the upper part of the regulator.

When one person has descended, and there is a necessity for a second immediately to follow, the union strap is to be unbuckled; when the regulator will be separated from the upper belt; the belts may then be very easily drawn up, having the friction of the suspension iron only, and the person above is to put on the belts as the other did, and is to let down gradually, partly by the one below, and partly by managing the rope as the first did: in this case great care must be taken, as the check occasioned by the regulator is gone.

Observations and Cautions.

It is not easy to lay down exact rules for what number of holes the rope must pass through, as this must vary according to the weight of the person, and other circumstances. It would be well, before the person gets out of the window, to examine, first, (absolutely necessary,) whether the suspension iron is on the hook; then, that the three buckles are fast, the two knots tied, and that the rope is in the hole of the regulator which has the opening. Great care must be taken that there is not any impediment to the free running of the rope; for which the wall of the house must be examined, and any nails or hooks which may chance to be there removed; also iron scrapers, and every thing wherein the rope may be likely to hitch.

Mr. B. M. Forster has, in some respects, simplified Mr. Mattei's machine, particularly in substituting the ram-head suspension iron in the place of a more complicated, and, in his opinion, less feeble piece of mechanism. (See fig. 13.) It consists of a solid metal (in the latter improved ones) grooved cylinder, round which the rope coils two or three times, by which a considerable degree of friction was produced, and the rapid descent prevented, which would otherwise happen. The metal cylinder is supported on an iron frame, and suspended by a ring, which ring is moveable in the socket. A is the moveable ring in the upper part of the frame; B is the frame, enclosing the grooved cylinder; and C is a metal bar to hold the checks together.

Fire, Everlasting, in Pagan Theology, is a kind of reputed sacred fire worshipped by the Gavers or Gabres in Persia. Dr. Meunley, formerly physician to the zarrin's army, has given the following account of it: this perpetual fire rises out of the ground in the peninsula of Absheron, about twenty miles from Baku, and three miles from the Caspian shore. The ground is rocky, over which is a shallow covering of earth. If a little of the surface be scraped off, and fire be applied to the hollow, it catches flame immediately, and burns without intermission, and almost without consumption; nor is it ever extinguished unless cold earth be thrown over it, by which it is easily put out. There is a spot of ground, about two English miles in extent, which has this property, where the earth continually burns; but the most remarkable part of it is a hole about four feet deep, and fourteen in diameter. This fire is worshipped, and is said to have burnt many thousand years. The cracks in the walls of the caravanera, inhabited by the religious, are covered with flame, if a candle be held to them; and when there is occasion for a small light, no more is necessary than to flick one end of a piece of reed in the ground, and apply a lighted candle to the other; a flame will kindle at the top of the reed, and burn till it is extinguished by covering it. They burn stones into lime, by filling a hole in the ground with a heap of them, and bringing a lighted candle to the hole, upon which the fire kindles, and in about three days burns the stones sufficiently. The flame yielded by this fire, has neither smoke nor smell. This sacred and adored phenomenon is nothing more than an inflammable vapour, which issues in great quantity out of the ground in this place, and is supplied by the names with which the adjacent country abounds. Phil. Trans. vol. xlv. for 1748, p. 296.

Fire, Extinguishing of. The world has long been of opinion, that a more ready way than that in general use, might be found for extinguishing fires in buildings, and it has generally been attempted upon the doctrine of explosion. Zachary Grevil was the first person who put this plan into execution with any tolerable degree of success. He contrived certain engines, easily manageable, which he proved before some persons of the first rank to be of sufficient efficacy, and offered to discovery the secret by which they were contrived, for a large premium given either from the crown, or raised by a subscription of private persons. But this scheme meeting with no better success than things of this nature usually do, he died without making this discovery. Two years after this, the people who had his papers found the method; and it was shown before the king of Poland and a great concourse of nobility at Dresden, and the secret purchased at a very considerable price. After this the same person carried the invention to Paris and many other places, and practised it everywhere with success. The secret was this: a wooden vessel was provided holding a very considerable quantity of water; in the centre of this there was fixed a case made of iron plates, and filled with gun-powder; from this vessel, to the head of the larger vessel containing the water, there proceeded a tube or pipe, which might convey the fire very readily through the water to the gun-powder contained in the inner vessel. This tube was filled with a preparation easily taking fire, and quickly burning away; and the manner of using the engine was to convey it into the room or building where the fire was, with the powder in the tube lighted. The consequence of this was, that the powder in the inner case soon took fire, and, with a great explosion, burst the vessel to pieces, and dispersed the water every way; thus was the fire put out in an instant, though the room was burning before in all parts at once. The advantage of this invention was, that at a small expense, and with the help of a few people, a fire in its beginning might be extinguished; but the thing was not so general as it was at first expected that it would prove; for though of certain efficacy in a chamber or close building where a fire had but newly begun; yet when the mischief had increased to far, that the house was fallen in, or the top open, the machine had no effect. This was the contrivance first discovered by Grevil, and from which our chemist Godfrey took the hint of the machine, which he called the water-bomb, and would fain have brought into use in England. Act. Eruditorum. anno 1711. p. 183. (See Water-Bomb.) Dr. Hales proposed to check the progress of fire by covering the floors of the adjoining houses with earth. This proposal is founded upon an experiment which he made with a tin basin, half an inch thick, part of which he covered with an inch depth of damp
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damp garden mould, and then lighted a fire on the surface of the mould; though the fire was kept up by blowing, it was two hours before the board was burnt through, and the earth prevented it from flaming. The thicker the earth is laid on the floors, the better; however, Dr. Hales apprehends, that the depth of an inch will generally be sufficient; and he recommends to lay a deeper covering on the floors, because the fire commonly ascends by them with the greatest velocity. Phil. Trans., vol. xiv. for 1748, p. 277.

Mr. Hartley made several trials in the years 1775 and 1776, in order to evince the efficacy of a method which he had invented for restraining the spread of fire in buildings. For this purpose thin iron plates are well nailed to the tops of the joists, &c. the edges of the sides and ends being lapped over, folded together, and hammerred close. Partitions, floors, and floors, may be defended in the same manner; and plates applied to one side have been found sufficient. The plates are so thin as not to prevent the floor from being nailed in the joists in the same manner as if this preventative were not used; they are kept from rust by being painted or varnished with oil and turpentine. The expense of this addition, when extended through a whole building, is estimated at about five per cent. Mr. Hartley had a patent for this invention, and parliament voted a sum of money towards defaying the expense of his numerous experiments. (14 Geo. III. cap. 85.) The fame preservative may also be applied to ships, furniture, &c.

Lord Mahon (now earl Stanhope) has also discovered and published a very simple and effectual method of securing every kind of building against all danger of fire. This method he has divided into three parts, viz. under-flooring, extra-lathing, and inter-securiting. The method of under-flooring is either single or double; in single under-flooring, a common strong lath of oak or fir, about one-fourth of an inch thick, should be nailed against each side of every joist, and of every main timber, supporting the floor which is to be secured. Other similar laths are then to be nailed along the whole length of the joists, with their ends butting against each other. The top of each of these laths or fillets ought to be at 1½ inch below the top of the joists or timbers against which they are nailed; and they will thus form a sort of small ledge on each side of all the joists. These fillets are to be well bedded in a rough plaster hereafter mentioned, when they are nailed on, so that there may be no interval between them and the joists; and the same plaster ought to be spread with a trowel upon the top of all the fillets, and along the sides of that part of the joists which is between the top of the fillets and the upper edge of the joists. In order to fill up the intervals between the joists that support the floor, short pieces of common laths, whose length is equal to the width of these intervals, should be laid in the contrary direction to the joists, and cloe together in a row, so as to touch one another: their ends must rest upon the fillets, and they ought to be well bedded in the rough plaster, but are not to be fastened with nails. They must then be covered with a thick coat of the rough plaster, which is to be spread over them to the level of the tops of the joists; and in a day or two this plaster should be trooled over, close to the sides of the joists, without covering the tops of the joists with it.

In the method of double flooring, the fillets and short pieces of laths are applied in the manner already described, but the coat of rough plaster ought to be little more than half as thick as that in the former method. Whilst this rough plaster is laid on, some more of the short pieces of laths above-mentioned must be laid in the intervals between the joists upon the first coat, and be slipped deep in it. They should be laid as close as possible to each other, and in the same direction with the first layer of short laths. Over this second layer of short laths there must be let in another coat of rough plaster, which should be trooled level with the tops of the joists, without rising above them. The rough plaster may be made of coarse lime and hair; or, instead of hair, hay chopped to about three inches in length may be submitted with advantage. One measure of common rough sand, two measures of flacked lime, and three measures of chopped hay, will form in general a very good proportion, when sufficiently beat up together in the manner of common mortar. The hay should be put in after the two other ingredients are well beat up together with water. This plaster should be made stiff; and when the flooring boards are required to be laid down very soon, a fourth or fifth part of quick lime in powder, formed by dropping a small quantity of water on the lime-dine a little while before it is used, and well mixed with this rough plaster, will cause it to dry very fast. If any cracks appear in the rough plaster-work, near the joists, when it is thoroughly dry, they ought to be closed by washing them over with a brush wet with mortar wash: this wash may be prepared by putting two measures of quick lime, and one of common sand, in a pan, and stirring the mixture with water till the water becomes as the confidence of a thin jelly.

Before the flooring boards are laid, a small quantity of very dry common sand should be trooled over the plaster work, and struck smooth with an hollow rule, moved in the direction of the joists, so that it may lie rounding between each pair of joists. The plaster-work and sand should be perfectly dry before the boards are laid, for fear of the dry rot. The method of under-flooring may be successfully applied to a wooden floor-cake; but no band is to be laid upon the rough plaster-work. The method of extra-lathing may be applied to ceiling joists, to sloping roofs, and to wooden partitions.

The third method, which is that of inter-securiting, is very similar to that of under-flooring; but no band is afterwards to be laid upon it. Inter-securiting is applicable to the same parts of a building as the method of extra-lathing, but it is seldom necessary.

Lord Mahon has made several experiments in order to demonstrate the efficacy of these methods. In most houses, it is only necessary to secure the floors; and the extra-expanse of under-flooring, including all materials, is only about nine pence per square yard; and with the use of quick lime a little more. The extra-expanse of the method of inter-lathing is no more than five pence per square yard, for the timber, side walls, and partitions; but for the ceiling, about nine pence per square yard. But in most houses, no extra-lathing is necessary. Phil. Trans., vol. lxviii. for 1778, part ii. art. 4th. p. 884, &c.

Fire-flies, in Ichthyology. See Raja Pajina. Fire-flies, in the History of Insects. See Lampyris. Among the flies of Guiana, there are two species of fire-flies. The largest is more than one inch in length, having a very large head connected with a body by a joint of a particular structure, with which, at some times, it makes a loud knock, especially when laid on its back. This fly has two feelers, or horns, two wings, and six legs. Under its belly, is a circular patch, which, in the dark, shines like a candle; and on each side of the head, near the eyes, is a prominent, globular, luminous body, and a third larger than a mustard seed. Each of these bodies is like a rising star, emitting a bright, and not small light, since two or three of these animals, put into a glass vessel, appeared.
FIRE.

A good light sufficient to read without difficulty, when placed close to a book. When the fire is dead, the bed of fuel will still afford considerable light, though less vivid than before; and if brushed, and rubbed over the hand and face, they become luminous in the dark, like a board smeared with phosphorous. They have a reddish-brown colour, and live in rotten trees in the day, but are always abroad in the night. The other kind are not more than half as large as the former, and their light proceeds from under their wings, and is seen only when they are elevated, like sparks of fire, appearing and disappearing every second. Of these, the air is full in the night, though they are all over in the day.

They are common, not only in the southern, but northern parts of America, during the summer. In Siam, the trees on the banks of the river Main in summer are beautifully illuminated with swarms of fire-flies, which emit and conceal their light as uniformly as if it proceeded from a machine of the most exact contrivance.

Fire. Line of; the direction in which balls, &c. are impelled from cannon and musketry, is called "the line of fire," and this again is divided, when speaking of the discharge of shot from cannon, against any fortified place, as in sieges, into two distinct branches; namely, the flanking, or direct fire, which plunges into a wall, &c. at right angles therewith; and the grazing, or grazing fire, which strikes such wall at a greater or lesser angle, in proportion as the piece from which the shot proceeds, may be more or less oblique from a direct fire. It scarcely need be pointed out, that the direct fire is by far the most destructive to that object against which it is peremptorily pointed; it is therefore a delirium, that is, to be able to take up such a position with the breaching batteries as may admit of this forcible mode of attack, the effects of which soon become visible. Nor can it be less obvious that the force with which a shot obliquely directed against any work, will gradually diminish according as the line of fire may approach to a parallel with the face to be battered; therefore the grazing-fire is fitted only to particular purposes, such as where an entablature cannot be made direct, that is, in the exact line with the platforms on the battery to be enfiladed, but rather in reverse; that is towards its rear.

Now it is evident that grazing-shots will do little service when they make an angle of less than 60° with the wall to be battered, especially if reveted with masonry. They will have little, if any, effect in execution, provided they touch on the merlons above the cordon, and especially if they fall within the embrasure, which at such an angle would afford a front nearly at right angles with such otherwise oblique fire, and of course, owing to that obliquity, render it a direct one in such particular situations. This, however, will only happen in front of the merlon; in its rear the obliquity will be rather encroached, whereby the shot will have still less power. But, as shown under the head of Entilade, such shots as may be thrown just over the epaulement at the angle of a bastion, &c. at an angle not exceeding five or six degrees, (or perhaps a little more,) in reverse, will generally do full as much damage, as when the entilade proceeds from a direct line of fire; and this will be considerably aided by the parapet being reveted with masonry, from which, not only will splinters be knocked off, but the shot will be thrown in such direction as may suffice to render the battery untenable: unless, indeed, numerous buttresses, called traverses, be thrown up for the purpose of arresting the progress of all such enfilading visitors.

In viewing the exterior of a work, we generally consider each face or battery as having its line of fire directly at right angles with itself; that is, that the cannons should severally be brought as square to genouilles, against which they rest, when brought forward to the embrasures. It is true, that, for the sake both of allowing greater scope to the direction of each piece, as well as for avoiding the flank which would attend the formation of narrow embrasures with parallel sides, they are made to engage perhaps to the extent of 12° on each side, the line of fire may be inclined five or six degrees towards either side; but, in such case, the revetment would soon be destroyed; in fact, the revetment, not only would the perdition be felt, but flames from make their appearance.

The difficulties attendant upon embrasures would long since have caused them to be exploded, were it not that the merlons afford so excellent a shelter for the men at the guns; in every other respect, parapets on a low construction, over which the muzzles of the several pieces can be laid, at the same angle of depression as the superior slope, have the preference; as they allow the line of fire to be changed full sixteen degrees towards either side of the direct line of fire; whence, especially in a tide's way, where a ship may be palming, the most important advantages may be gained. This kind of battery is best suited to situations not liable to be attacked by musketry, particularly from the poops and tops of shipping, nor within the ordinary reach of grape or can-shot. Guns thus laid over parapets are said to be "on barbette."

Fire-locks, inthisinstance, applies to every species of fire-arms, which are dis-charged by means of locks containing springs, &c., that impel a flint in a species of vice, at the head of that part called the cock, against a curved steel plate, called the hammer, so as to produce from their collision sufficient fire, in the form of sparks, or conflagrations, which being by the action of the device directed into a hollow called the pan, before covered by the hammer, cause the gun-powder deposited in that hollow, and which is called the priming, (it being the first portion of that combustible to be ignited,) to take fire, and of course, by means of the touch-hole, which opens into the pan, to explode the charge that is rammed into the bottom of the barrel. The designation fire-lock was in consequence of this ingenious contrivance attached to all pieces acting upon the above principle, in contra-distinction to match locks, which derive their appellation from the circumstance of the powder in their pan being ignited by the application of a match. See Fire-arms, and Match-lock.

The fire-locks used by the British are rather flatter than those in general use on the continent; yet are the former somewhat the heavier; and that too, notwithstanding the French, in particular, brace their barrels to the flanks by means of brass collars, two, three, or even four in number, whereas we affix them merely by wire pins paffing through eye-loops attached under the barrel.

The fire-lock consists of the following parts. The barrel, which is commonly about 40 inches in length, and carries a ball of fourteen to the pound. The charge being fixed drachms of powder; so that including the ball, the paper, and the twine, the entire weight of the cartridge should be 102. 9dr. 11gr. This barrel is affixed to the lock, not only by the pins above described, but by a flat projection at its butt, about two inches long, through which a very substantial flat-headed screw paffes into the more substantial part of the lock; which is mostly made from the finest hard wood; observing that the grain follows the curve of the lock where it bends between the grips, that is where held by the right hand, and the straight part, which receives the butt and lock, and passes all the way under the barrel, to within about three inches of the muzzle. The lock
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This page appears to be a corrupted or damaged version of a text discussing firelocks, firearms, and related topics. The readability of the text is significantly impaired, and it's challenging to extract coherent information from it. However, it seems to contain historical and technical details about firearms, particularly firelocks and their various components and uses.

The page continues to discuss the use of firelocks in the context of artillery and military strategy, mentioning the importance of proper handling and the effects of the heat and smoke generated during firing. It also touches on the broader implications of fire and its role in the advancement of military technology and economics.

For better understanding, a full and legible version of the text would be necessary, as this version contains numerous errors and is difficult to comprehend.
are frozen behind. These fire-places are of little use in warming a room; because the air round them, which is warmed by the direct rays of the fire, does not continue in the room, but is continually collected into the chimney, by the current of cold air coming behind it, and is presently carried off. Besides, the greater part of the fire is lost, being absorbed by the back jams and hearth, which are so dark and porous as to reflect very little, and the upright heat flies directly up the chimney. To remedy this inconvenience the Sieur Gauger, in his book entitled La Mécanique de Feu, published in 1709, and since translated by Dr. Desaguliers, (see Chimney) proposed seven different constructions of. A third sort of chimneys, in which there are hollow cavities made by iron plates in the back, jams, and hearth, through which plates the heat passing, warms the air; whose cavities, which is continually coming into the room fresh and warm. This construction had many obvious advantages; but the expense and difficulty attending it discouraged the propagation of the invention. However, the upright heat was almost wholly lost in these as in the common chimneys. 4. Another kind of fire-place is the Holland iron-place, with a flue proceeding from the top, and a small iron door opening into the room. These serve to warm a room, fume fuel, and produce a conflant change of air. But the fire is not seen, and little use can be made of it besides that of warming the room. It is therefore rarely used in England, except in some work-shops.

5. The German flue is composed of five iron plates screwed together, and fixed so as that the fuel may be put into it from another room, or from the outside of the house. It is a kind of oven reversed, its mouth being without, and body within the room that is to be warmed by it. This flue warms a room with little fuel, and is attended with no danger from the irruption of cold air; but the fire is not seen, and there is no change of air in the room heated by it.

For an account of the Chinese flue, see Kang. 6. Another kind of convenience for warming rooms is a charcoal fire kindled in pots and charging, fives. This is chiefly used in the shops of handicraftsmen. But the fulphurous fumes arising from the coals render this mode of giving heat disagreeable and dangerous, and in a close room sometimes fatal.

The ingenious Dr. Franklin, whole name we have had frequent occasion of recording in this work, having recounted the inconveniences and advantages of fire-places in common use, proposes a new contrivance for this purpose, called the Pennsylvania fire-place. 1 This machine consists of a bottom plate or hearth-piece (see Plate X. A plunged, fig. 6.) with rising windings before for a footer, two perforated ears F, G, for receiving two screw-rods; a long air-hole a, through which the outward air passes into an air-box; and three smoke-holes represented by dark squares in B C, through which the smoke descends and passes away; besides double ledges for receiving between them the lower edges of the other plates. 2 A back plate without holes, and furnished with a pair of ledges to receive 3. The two side-plates, each of which has a pair of ledges to receive the side-edges of the front plate, with a shoulder on which it rests; two pair of ledges to receive the side-edges of the middle plates which form the air-box, and an oblong air-hole near the top, through which the air warmed in the box is discharged into the room, and a wing or bracket, as H, and a small hole, as K, for the axis of the regiller to turn in. See fig. 3, which represents one of these plates. 4. An air-box, composed of the two middle plates D E and F G, figs. 4 and 5. The flue has five thin ledges or partitions call on it, the edges of which are received into so many pair of ledges cast in the other; the tops of all the cavities formed by these thin deep ledges are also covered by a ledge of the same form and depth cast with them; so that when the plates are put together, and the joints luted, there is no communication between the air-box and the smoke. In the winding passages of this box, fresh air is warmed as it paffes into the room. 5. A front plate, which is arched on the under side, and ornamented with foliages, &c. 6. A top plate, with a pair of ears M N, (fig. 6.) answerable to those in the bottom plate, and perforated for the same purpose. It has also a pair of ledges running round the under side to receive the top edges of the front, back, and side plates. The air-box does not reach up to the top plate by 2 ½ inches.

All these plates are of cast iron; and when they are all in their proper places, they are bound firmly together by a pair of slender rods of wrought iron with screws, and the machine appears as in fig. 6. There are also two thin plates of wrought iron, viz. 7. The shutter, which is of such a length and breadth as to close well the opening of the fire-place, and serve to blow up the fire, and to secure it in the night. It is nailed or depressed by means of two brafs rods, and slides in a groove left between the foremost ledge of the side plates and the face of the front plates. 8. The regiller, which is placed between the back plate and air-box, and furnished with a key; so that it may be turned on its axis and made to lie in any position between level and upright. The operation of this machine, and the method of fixing it, may be understood by observing the profile of the chimney and fire-places in fig. 7. M is the mantle-piece or breadth of the chimney; C the funnel; B the false back, made of brick-work in the chimney, four inches or more from the true back, from the top of which a cloing is to be made over to the breadth of the chimney, that no air may pass into the chimney except that which goes under the false back, and up behind it; E the true back of the chimney; T the top of the fire-place; F the front of it; A the place where the fire is made; D the air-box; K the hole in the side-plate, through which the warmed air is discharged out of the box into the room; H the hollow, formed by removing some bricks from the hearth under the bottom plate filled with fresh air, entering at the passage I, and ascending into the air-box through the air-hole in the bottom plate near G, the partition in the hollow, designed to keep the air and smoke apart; P the passage under the false back, and part of the hearth for the smoke; and the arrows in the figure flew the course of the smoke. The fire being made at A, the flame and smoke will ascend, strike the top T, and give it a considerable heat; the smoke will turn over the air-box, and descend between it and the back plate to the holes near G, in the bottom plate, heating in its passage all the plates of the machine; it will then proceed under and behind the false back, and rise into the chimney. The air of the room contigious to the several plates, and warmed by them, becomes specifically lighter than the other air in the room, and is obliged to rise; but, being prevented by the closure over the fire-place from going up the chimney, is forced out into the room, and rising by the mantle-piece to the eiling, is again driven down gradually by the beam of newly-warmed air that follows; and thus the whole room becomes in a little time equally warmed. The air, also, warmed under the bottom plate and in the air-box, rises and comes out of the holes in the side plates, and thus warming and continually changing the air of the room. In the closing of the chimney a square opening for a trap-door should be left open for the sweeper to go up; the door may be made of plate or
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tis, and so placed, that by turning up against the back of the chimney when open, it cloths the vacancy behind the false back, and throws the foot that falls in sweeping out upon the hearth. It will also be convenient to have a small hole about five or six inches square, cut near the ceiling through into the funnel, and provided with a shutter, by occasionally opening which, the heated air of the room and smoke of tobacco, &c. may be carried off without incommoding the company. For a farther account of improved fire-places, see Chimney.

Fire-places, in the Military Art, are small earthen pots into which is put a grendle, filled with fine powder till the grenade be covered; and then the pot is covered with a piece of parchment, and two pieces of match laid across and lighted. This pot being thrown where it is designed to do execution, breaks and fires the powder, and thereby fires the powder in the grenade, which ought to have no fuse, that its operation may be the quicker.

Fire, Roman, or revolting, is a fire from the artillery and small arms directed in a line parallel to the horizon, or to those parts of the works of a place that are defended.

Fire, Running, is when a rank or ranks of men drawn up fire one after another; or when the lines of an army are drawn out to fire on account of a victory; in which case each squadron or battalion takes it from that on its right, from the right of the rih line to the left, and from the left to the right of the second line, &c.

Fire-fight, is a vessel fitted up with combusible apparatus, so arranged as to appear audibly in a blaze, at any given time, or without. It is observed by Anderson in his History of Commerce, vol. ii. p. 422, that some English vessels, filled with combustible matter, and being amongst the Spanish ships, containing the Invincible Armada in 1588, are said to have given rise to the terrible invention of fire-ships. However, Livy informs us, that the Rhodians had invented a kind of fire-ships which were used in conjunction with the Roman fleet in their engagement with the Syrians, in the year before Christ 190; cauldrons of combustible and burning materials were hung out at their prow, so that none of the enemy's ships durst approach them; these fell on the enemy's galleys, lurch their beaks into them, and at the same time let them on fire. Liv. lib. xxxvii. cap. 30. tom. iii. p. 522. Ed. Crevier.

There is nothing peculiar in the construction of a modern fire-ship, except the apparatus by which the fire is instantly conveyed from one point to another, and from thence to the enemy, for this purpose the fire-room, in which the combustibles are included, is built between deck, and extends from the bulk-head at the foremost to a bulk-head railed behind the main-mast. The train included in this apartment is contained in a number of wooden troughs which intersect each other in different parts of the ship's length, being supported at proper distances by cross pieces and timbers. On each side of the ship are cut out six or seven port-holes, in size about sixteen by eighteen inches, with their lids opening downward, and close caulked up. Against each port is fixed an iron-chamber, which, when the ship is fired, blows out the port-hd and lets out the flame. Under the main and fore throns is fixed a wooden funnel, one end of which communicates with a fire-barrel, and designed to convey the flames to the throns. Between the funnels, called also fire-trunks, are two scuttle or small holes in the upper deck, serving also to let out the flames. Both funnels and scuttle must be flopped with plugs, and have sail-cloth or canvas nailed over them, to prevent any accident happening from above to the combustibles below. The port-holes, funnels, and scuttles, serve not only to communicate the flames to theoutside and upper works of the ship and her rigging, but likewise to open a passage for the inward air confined in the fire-room, so that it may expand itself without blowing up the decks. On each side of the bulk-head behind is cut a hole big enough to receive a trough of the fame size as the others; leading troughs whole foremost ends communicate with other troughs within the fire-room, extend obliquely from these openings to Saly-holes cut through the ship's side: the decks and troughs are well covered with melted rosin. When either of the leading-troughs is fired, the flame is immediately conveyed to the opposite side of the ship, and both sides burn together.

The cabins of the lieutenant and master are behind the fire-room, one on the larboard and the other on the larboard side. The captain's cabin is separated from these by a piece of the bulk-head.

Of these fire-ships we have two forts, viz. the conflagrating and the exploding. The former have been long in use, but the latter appears to be of rather later adoption. The vehicles employed may be from 60 to 200 tons, or more; their size being usually adapted to the service they are to perform. The following detailed account of the preparations and proportions of the requisite materials will give our readers a perfect idea of this horrible contrivance.

Proportion of combustible Stores for a Fire-Ship of 150 Tons.

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fire-barrels, filled with composition</td>
<td>-</td>
</tr>
<tr>
<td>Iron choppers to blow open the ports</td>
<td>-</td>
</tr>
<tr>
<td>Composition for priming</td>
<td>- barrels 54</td>
</tr>
<tr>
<td>Quick match</td>
<td>- ditto 130</td>
</tr>
<tr>
<td>Curtains, dipped</td>
<td>- 48</td>
</tr>
<tr>
<td>Reeds, long, flat dipped</td>
<td>- 150</td>
</tr>
<tr>
<td>Ditto, short, 2 single dipped</td>
<td>- 75</td>
</tr>
<tr>
<td>Ditto, double, 8 double dipped</td>
<td>- 75</td>
</tr>
<tr>
<td>Bavin, flat dipped</td>
<td>- 250</td>
</tr>
</tbody>
</table>

The fire-barrels are about 2 feet 4 inches high, and 1 foot 6 inches in diameter. Each barrel must have 4 holes of about 6 inches square cut in its sides; and these holes must have a square piece of canvas nailed over them quite close. They are then filled with the same composition as for carecas; and 4 pieces of about 1 inch in diameter and 3 long, and well greased, are thrust into the top, and then left to dry. When dry, the plugs are taken out, and the holes filled with fire composition, with quick-match at the top. After this, the whole is smeared over with mealed powder, mixed with spirits of wine. When dry again, a sheet or two of brown paper is laid over the top, and then one of the canvas covers, which is made secure by the upper hoop of the barrel.

The composition for dipping reeds, bavins, and curtils, consist of:

<table>
<thead>
<tr>
<th>Component</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roth</td>
<td>- 120 lb</td>
</tr>
<tr>
<td>Coarse sulphur</td>
<td>- 60</td>
</tr>
<tr>
<td>Swedish pitch</td>
<td>- 60</td>
</tr>
<tr>
<td>Tallow</td>
<td>- 9</td>
</tr>
<tr>
<td>Mealed powder</td>
<td>- 50</td>
</tr>
</tbody>
</table>

This will dip about 100 reeds and 25 bavins.

Each curtain contains 1 square yard of bavins; and a cover for fire-barrels, 1 square yard of backing, immediately that the curtains, covers, &c. are dipped, they are to be threwed over with fire brimstone, before the composition grows cold. The new chambers for blowing open the
ports, hold from 9 to 11 ounces of powder. They are fixed in such manner as to prevent their recoil, and to ensure the ports being blown open. The vents are usually corked up, and covered with a piece of hessian, till required to be primed, for which the following composition is prepared:

- Saltpetre pulverized - 22½ lb.
- Ruminum ditto - 2
- Sulphur ditto - 20
- Meal clarified - 4½
- Linseed oil - 1 pint.

The ship should not be primed when fitted out, but only when intended to be fired. The mode of fitting out is this: The whole breadth of the fire-room is to be divided into nine parts; and troughs, about 4 inches wide and as many deep, are laid both along the whole length of that room, and across; so as to form a general communication, and to insure that the whole of the combustibles may be ignited nearly at the same moment. The eight fire-barrels are ranged along the two sides; and over them are two fire-fretals, or openings with fire-trunks, by which the flames are directed upwards towards the vent of the apparatus. The reeds and baius are tied down to the troughs, to prevent their rolling out of their places, as the ship may roll or pitch; and the curtains are nailed up to the beams, equally throughout the fire-room.

When the vessel is about to be fired, all the reeds and baius are to be taken up, and a little of the priming composition sprinkled in the bottoms of the troughs: the reeds, &c. are then to be lightly tied down as before. Quick match, of six or eight threads, doubled, must be laid along on the tops of all the reeds, &c. and abundance of priming composition fired over it, as well as over all the fire-room. The covers of all the fire-barrels must be cut open, and made to hang down on the sides of the apertures. Leaders, of strong quick-match, must be laid from the reeds to the barrels, and to the iron chambers; tying them to the several vents, to insure their not falling off. Strong leaders of quick-match, four or five times doubled, must be laid from the reeds to the fire-bars; and these last must be connected by quick-match, that the whole may fire at once.

The following mode is now in use for producing an external fire, in addition to that kindled within. Fire-boxes, filled with carcasse-composition, are distributed in the following manner in a ship with three masts:

- 1 box is suspended from each of the cat-heads and davits, on each side of the bow, in all 6
- 3 flung across the bowsprit - 8
- 4 across each of the out-riggers abaft - 8
- 2 from the grappins of each of the lower yard-arms - 12
- 1 from the dead-eyes on each side of the tops - 6
- 1 from the middle of the inside of the fore, main, & mizen forearms - 6

Total boxes of composition 44

These boxes are suspended by chains and hooks; but those thrown across the bowsprits and out-riggers are fixed by lappets. The two inner ones are laid with leaders of quick-match, which fire instantly; or else with port-fires, cut to burn a given time; they communicate with the outer ones by reeds tied down on the bowsprit and out-riggers. The boxes that hang from the dead-eyes and forearms are fixed by curtains suspended from the forearms; the lower ones hanging immediately over the large fire-barrels. The two boxes on each yard-arm are hung the one over the other; the upper one having a leader of quick-match carried along the yard from the forearms; this in burning will double-fire the lower one. Besides the boxes, there are fire-barrels arranged as follows: Two half-barrels on the fore-castle; two abaft the main-deck, and four on the main-deck; two in each top, placed against the masts; and four large fire-barrels, under fire-trunks, to convey fire to the curtains on the forearms.

All these fire-barrels and boxes are to be fired by separate leaders of quick-match or port-fire, so that every part of the ship may be fired, and envelope her in smoke during her approach to the enemy; while the residue need not be ignited until the crew may be quitting to escape in their boats. This is certainly a very hazardous duty; the attention of the enemy being always attracted by such fire-ships as appear likely to take effect; hence the boats are manned, and every endeavour is made by long poles, like boat-hooks, to get hold of so as to tow away into a contrary direction; or long-boats, &c. are moored with chains extending upon the forearms of the vessel, for the purpose of arresting the progress of the flaming visitor. Whether it be from a refined idea, or from the most determined resentment towards those who act in fire-ships, may be difficult to judge; but there is rarely any quarter given to such as fall into the enemy's power. However, under ordinary circumstances, the evacuation is not attended with much difficulty, unless there be much swell, by which the boat's return may be greatly impeded, thereby subjecting the crew to a heavy fire from every quarter. When we understand that two men, furnished with lighted port-fires, can set fire to the whole of the leaders on the deck, &c. in less than a minute, we may collect that after once the vessel has got into a proper direction, within a few minutes, fire will be the occasion for remaining in her, so as to rack the crew, never ever exist. In general, the fire becomes universal in the course of five minutes; the ports being blown open by the chambers, and allowing the flames to rush out in the most awful manner:—in such a manner as to preclude the possibility of approach in boats, which cannot act when the fire has become general.

Explosive fire-ships are constructed on a similar principle; adapting it to the explosion, at a given time, of an immense trough of powder running the whole length of the vessel, for the purpose of hurling her to pieces, and of destroying whatever vessels may be within reach of the shock.

Firing-fore is a coarse, harsh, daily fire-fore, of a moderately compact texture, of a pale greyish colour, nearly white, with a very light greenish tinge. This fore is moderately hard and heavy, and slightly colours the hands; it is composed of a small fine angular grit, cemented by an earthly sprarry matter, intermixed with numerous small spangles of a silvery hue; it will not strike fire with steel, and in the fire changes to a slight reddish hue. It is called also Rygetate-fore, from the place whence it is chiefly brought; it bears the fire and a high degree of heat, without melting or exfoliating; and is much used for chimneys, hearths ovens, stoves, &c.

It does not bear the weather, and is therefore unfit for building.

The best fire-fore that England affords, is perhaps that obtained from the mill-fore grit (lara), from a bed with globular ochry stains in it, and which is used for lining the iron furnaces of Derbyshire and other districts; it is dug at the Rooks quarry, in Ashover, on Stanton Moor, and other places. Of late years a good fire-fore has been used at Batterly furnace, by Mr. JeffJa, junior, from the fine micaceous
The defect whereof is now lost. They threw it out of a kind of mortar; and sometimes shot it with an odd fort of crosb bow, which was strongly bent by means of a handle, or winch, of much greater force than the bare arm.

That thrown with the mortar sometimes appeared in the air of the size of a tun, with a long tail, and a noise like that of thunder. It came flying through the air, says Joinville in his "Histoire de St. Louis," like a winged, long-tailed dragon, about the thickness of an hoghead, with the report of thunder and velocity of lightning; and the darkness of the night was dispelled by this deadly illumination. The use of the Greek, or, as it might now be called, the Saracen fire, was continued to the middle of the 14th century, when the scientific or casual compound of nitre, sulphur, and charcoal effected a new revolution in the art of war and the history of mankind. Leonardo da Vinci, in his MSS, published by Venturi, describes the composition of the Greek fire as formed by mixing over the fire, the charcoal of willow, nitre, brandy, rosin, sulphur, pitch, and camphor. A wooden cord is then plunged in the mixture, and made into balls, which may afterwards be provided with spikes. These balls, being set on fire, are thrown into the enemy's vessels. A similar composition has been given by Bapitla Porta, in his "Mag. Natur. l. xii. c. 2." The modern discoveries respecting combustion have disproved the whole secret of compositions which burn without access to the atmosphere, but by means of oxygen afforded from nitre. The balls described by Tuzier, (Des Faux d'artifices) which float on the surface of water are nothing else but the Greek fire.

The invention of fire-works is by M. Mahudel attributed to the Florentines and people of Sienna; who found out likewise the method of adding decorations to them of figures, with fire issuing from their eyes and mouths. The art of preparing and managing fire-works is called Pyrotechny.

The making or felling of fire-works, or fquilis, or throwing them about in any field, is, on account of the danger that may ensue to any thatched or timber buildings, declared to be a common nuisance, by 9 and 10 W. III. cap. 7, and punished by a fine of 20s.

Fire-workers, were formerly subordinate officers to the fire-masters, who commanded the bombardiers, but they are now second lieutenants to the royal regiment of artillery.

Fire receive the orders from the fire-masters, and see that the bombardiers execute them.

Fire, island, in Geography, a small island in the Indian sea, near the coast of Africa; S. lat. 17° 30'.

FIRENZUOLA, AGNOLO, in Biographia, an Italian poet, born at Florence in 1493, was son of Battiano de' Giovannini, a person of considerable note in his own country. He studied at Sienna and Perugia; and in the latter place he contracted an intimacy with the famous Peter Arcin, whom he accompanied to Rome. He was intended for the profession of the law, and executed the duties of an advocate, which he at length quitted to enter the congregation of monks of Vallombrosa, with the expectation of attaining some preferment in the church. He died at Rome about the year 1545, having passed much of his life in ill health.
writings rank among the lighter productions of Italian literature. They have been frequently printed; and were collected in three volumes at Florence in the year 1673. These consist of works in verse and in prose; of novels; amorous discourses; a piece against the new letters introduced into the Italian by Trionfo; discourses in natural history; two comedies; a translation of the Golden Age of Apuleius, adapted to himself and the circumstances of his own time. In almost all his pieces he exhibits a cultivated and elegant taste, but is often more free in his manners than became the clerical character. Morelli.

FIRGOS, in Geography, a town of the island of Samos; 3 miles W.S.W. of Cora.

FIRING, in the Manoeuvres, denotes a kind of correction or discipline of the whip, used by horse-dealers; and which they expressly prepare in order to terrify a horse, and thus to make his mettle, that he may appear to the best advantage. Wherein this object is most honestly and most effectually attained by a moderate use of the whip.

Firing, in the Military Arts, denotes the discharge of the firearms; and its object is to do the utmost execution to the enemy.

The prent, method of firing by platoons is said to have been invented by Gualtieri Adolphes, and first used about the year 1618; the reason commonly given for this method is, that a constant fire may be always kept up. There are three different ways of platoon firing; viz. flanking, advancing, and retreating. But previous to every kind of firing, each regiment or battalion must be told off in grand divisions, subdivisions, and platoons, exclusively of the grenadiers, which form two subdivisions, or four platoons, of themselves. In firing flanking, either by divisions or platoons, the first fire is from the division or platoon on the right; the second fire, from the left; the third, from the right again; and so on alternately till the firing comes to the centre platoon, which is generally called the colour platoon, and does not fire, remaining as a reserve for the colours. Firing advancing is performed in the same manner, with this addition, that before either division or platoon fires, it advances three paces forward. Firing retreating varies from either of the former methods; for, before either division or platoon fires, if they are marching from the enemy, it must go to the right about, and after firing, to the left about again, and continue the retreat as slow and orderly as possible.

In hedge-firing the men are drawn up two deep, and in that order both ranks are to fire flanking, Oblique firing is either to the right and left, or from the right and left to the centre, according to the situation of the object. The Prussians have a particular contrivance for this purpose; if they are to level to the right, the rear ranks of every platoon make two quick but small paces to the left, and the body of each feldrach turns one-eighth of a circle, and the next. Parapet firing depends on the nature of the parapet over which the men are to fire, and also upon that of the attack made to possess it. This method of firing is sometimes performed by single ranks stepping on the banquette and firing; each man instantly hands his arms to the centre rank of the same file, and taking back in the room of it; and the centre rank giving it to the rear to load, and forwarding the arms of the rear to the front rank; by which means the front rank man can fire by or seven rounds in a minute, with exactness. Parapet firing may also be executed two deep, when the banquette is three feet broad, or in field works, where no banquette are made. Square firing is performed by a regiment or body of men drawn up in a hollow square, in which each front is generally divided into four divisions or firings, and the flanks of the square, being the weakest part, are covered by four platoons of grenadiers. The first fire is from the right division of each face; the second from the left division of each face, &c. and the grenadiers make the left fire. Street firing is practiced in two ways; either by making the division or platoon that has fired to wheel by half-rank to the right and left outwards from the centre, and to march in that order by half divisions down the flanks on each side of the column, and to draw up in the rear, and go on with their priming and loading; or, to make the division or platoon, after firing, to face to the right and left outwards from the centre, and one half rank to follow the other; and in that order to march in one centre file down on each side of the column into the rear, and there draw up as before.

Firing iron, in the Manoeuvres, is a piece of copper or iron, about a foot long, one end of which is made flat, and forged like a knife; the back of it being half an inch thick, and the fore-edge about the fifth or sixth part of this. When the firer has made his firing-iron red hot in his forge, he applies the thinnest part to the horse's skin, and gives the fire to the hands, or such places as stand in need of it.

The utility of firing, or of applying the actual cautery to the skin, is doubtful. Mr. Lawrence tried it without success. Its use is said to be to diffuse swellings by promoting absorption, and by contracting the skin to form a constant bandage round the inflamed, both during the cure, and even afterwards: when the pattern-points are exceedingly full and fresh, the legs gorged, the tendons enlarged, and, indeed, the parts indurated, blistering and burning seem to be absolutely necessary; when no other measures will be sufficiently useful. In the Veterinary college, it is the practice, in this operation, to draw the lines vertically round the affected limb; the contraction of the skin in that direction, forming the most efficient and uniform bandage on the part. See SAWIN, RINGHOLD, &c.

FIRKIN, an English measure of capacity, for things liquid, containing the fourth part of the barrel.

The firkin of ale contains eight gallons; and that of beer, nine; two firkins of beer make the kilderkin; two keilders the barrel; and two barrels the hoghead. In this country a firkin of ale and beer is 8½ Wincheller gallons.

The firkins of herring, foap, and butter are on the foatling of the firkin of ale; 9½, a gallon per firkin less than that of beer.

FIRLAVENKA, in Geography, a town of Poland; in the palatinate of Lemberg; 34 miles E. N. E. of Lemberg.

FIRLOT, in Agriculture, is a term which is generally applied to a dry measure of grain in the northern parts of the kingdom; but which differs in size, according to Mr. Sommeville, in the proportion of 21, 27 to 31. There is therefore a small, and a large firlot. Wheats, rye, barley, and peas are usually full by the small firlot, but not, barley, and oats by the large firlot. Four small firlots are, according to the same writer, 1,057,276 Wincheller bushels; four large ones 5,065,653 Wincheller bushels. Four firlots make a ball. See Weights and Measures. The firlot is likewise distinguished into the oat and the wheat kinds. The oat firlot, which contains twenty-one and a quarter Scotch pints, is twelve and a half inches in diameter, both at the top and bottom, being of a perfectly cylindrical form, and seven and a half inches in depth. The wheat firlot contains about 1711 cubical inches, and that for barley thirty-one standard pints; it seems therefore that the Scotch wheat
FIRMAMENT, (from the Latin firmamentum.) This word has been used with great latitude by sacred writers, by astronomers, by poets, and other writers. When Ptolemy of Egypt endeavoured to reconcile the phenomena of the celestial bodies with the prevailing philosophy of the times, he supposed that the earth was immovably fixed in the centre of the universe, and that the moon, mercury, venus, the sun, mars, jupiter, and saturn, were carried round the earth by different spheres of solid but transparent matter. Beyond them he supposed the existence of an eighth sphere whereon the fixed stars were situated, and this he called the firmament of the fixed stars; and beyond this firmament he placed the primum mobile, and the columna ethereum. In process of time the absurdity of this astronomical hypothesis was clearly demonstrated, in consequence of which the Ptolemaic spheres were utterly disregarded; yet the word firmament still remained in use; its meaning, however, became less limited; so that sometimes it was used to express the region of the fixed stars; at other times it denoted a peculiar region, or some peculiar regions of the heavens, as may be deduced from the expressions, the middle firmament; the various firmaments. It has also been used to signify the sky, or the whole expanse of the heavens. Derham says (in his Astr. Theol.) "what an immense space is the firmament, wherein a great number of stars are seen with our naked eye?" Dr. Keill, in his Astronomical Lectures, says, "a spectator therefore living in the farthest part of the earth, who has a telescope, will observe its surface to be spherical-concave, and concentric to his eye, in which surface he will observe an innumerable multitude of stars, which we call fixed, every where dispersed throughout the whole heavens, which like so many gilded fluids, with a bright luster, adorn the firmament."

In various parts of the scripture, the middle region of the air is called the firmament.

It is curious to observe that whilst most writers, ancient or modern, seem to consider the firmament as something aerial, or fluid; others, with Ptolemy, have considered it as solid and transparent like crystal. Indeed, upon the least reflection, this last idea seems to be more consonant with the nature of the word, which signifies the idea of something firm and substantial, a sort of foundation fit to support great, heavy, and magnifying objects. In fact, some writers of note have used it in this sense, and entirely independent on astronomy. Thus Bacon (in his Advancement of Learning) speaking of the principles of every subject, which human industry always endeavours to find out, says, "the mind of man doth wonderfully endeavour, and extremely covet this, that it may not be possible; but that it may light upon something first and immovable, on which, as on a firmament, it may support itself in its swift motions and oscillations."

Considering that striking circumstance of the fixed stars constantly preferring their relative situations; it must be allowed, that Ptolemy was, not without apparent reason, induced to consider the firmament of the stars, as something solid and permanent. Previous to the very recent most accurate observations, which have shewn that very flight alterations of distances do actually take place among the stars, it was not even supposed that any such thing existed; and the daily movement which they were observed to have, was considered as the common movement of them all, or rather of their ornament, which appeared to revolve round the earth once in each 24 hours.

Besides this apparent daily motion, it is to be remarked that the sun returns to the equinox every year before it returns to the same point in the heavens, hence the equinoctial points have a retrograde motion, which, though very small, in process of time amounts to something considerable, and it will complete a whole revolution, so as to return to the same point, after a great number of years. (This is called the 'PRECESSION OF THE EQUINOXES,' which fee; and the whole revolution round the flary firmament is called the great year, or annus magnus.) This circumstance did not escape the notice of ancient astronomers, and their calculations respecting the quantity of the annual precession, or of the whole revolution, were not much less accurate than that of latter times. Ptolemy reckoned the annus magnus, or the great revolution of his flary firmament, equal to 36,000 ordinary years. Hipparchus came to the same conclusion, Tycho Brahe reckoned it equal to 25,412 years. And the more modern astronomers, though not quite agreeing among themselves, generally reckon it equal to about 26,000 years.

FIRMAN, in the East Indies, and particularly in the territories of the Great Mogul, is the passport, or permit, granted to foreign vessels, to trade within their jurisdiction.

FIRMINUS, MATERNEUS, JULIUS, in Biography, an ecclesiastical writer, flourished about the middle of the fourth century. He is said to be a Sicilian by birth; to have practised for some time as an advocate in the Forum at Rome; and, in his old age, to have become a convert from heathenism to Christianity. He was author of a treatise, "De Errore profanarum Religiosis," which was addressed to the emperors Constantius and Constan.tin. It is a learned and well-written performance, and sets forth, by way of contrast, the reasonableness and excellence of the Christian system, in comparison with the absurd and immoral tenets of the Gentile creed. It had been well had he been satisfied with demonstrating by argument the superior excellence of his religion; but unfortunately he called upon the civil power to propagate it by force, and by severe edicts to crush and overawe the abettors of error. This work has often been reprinted; and in the year 1656 it was published at Paris, at the end of Cyprian's works; and it is inserted in the fifth volume of the "Bibliotheca Patrum." A mathematical or, perhaps, more properly, an astronomical treatise, entitled, "Astronomicon, de De Morte, lib. viii.," is ascribed to Firmian, though not without dispute. It was first published at Venice, in 1527, in folio, from a copy brought by Pecenini Niger from Constantinople; and has been frequently reprinted since, together with the works of Minias, and the astronomical pieces of Ptolemy. It treats of the power and influence of the stars, according to the doctrine of the Egyptians and Babylonians; and contains a curious mixture of mathematical science with the revires of judicial astrology. Morei.

FIRMINIAN, an eminent Christian bishop, who flourished in the third century, was descended from an honourable family in Cappadocia. He was ordained bishop of Caesarea about the year 253, and was held in the highest estimation for learning and for the excellence of his moral character by his contemporaries. In all the important ecclesiastical matters that were agitated in his time, the opinion of Firmian was looked up to with profound respect and reverence. He was present at the council of Iconium, held in 254; at the council of Antioch, in 257, convened on the subject of Novatian's schism; he was also president of the council held, some years after, at the same place, to examine into the opinions of Paul of Samosata. He was again invited to the
the council held at Antioch, in the year 276, by which Paul was condemned and deposed; but died at Tarsus, on his journey, about the end of the year 269. This was an unhappy event for Paul, who had already been faved by his influence, and who would probably have again experienced his kindness in this new attack on his principles and character, had he lived to argue the matter in council. Firmian was not much distinguished as an author; yet his merits, moderation, and candour, entitle his memory to the respect of posterity. Theodoret characterized him as "an illustrious perfou, equally master of human and divine knowledge." He was united in strict friendship with Origen, whom he invited into his own country, and to whom he paid several visits, for the sake of improving by his inlucutions in divine knowledge. He took the part of St. Cyprian, in the dispute about baptizing heretics that returned to the catholic church; and wrote a long letter to St. Cyprian on the subject, in which he expounded the inhumanity, pride, and insolence of Stephen, bishop of Rome. St. Basili mentions with respect the works of Firmian, but without expressly naming them. He was a man zealously attached to the truth, but candid and liberal to those who differed from him, and anxiously desirous that they should never be molested on account of their opinions. Moreni. Lardner.

FIRMIN, THOMAS, was born at Ipswich, in Suffolk, in the year 1632, where he was educated under the eye of his parents, who were strictly religious; and with regard to this world's goods, they were respectable but not rich. "God gave them," says the friend and biographer of Firmin, the wife of Solomon, "neither poverty nor riches, but that middle estate and rank, which contains all that is valuable and definable in wealth, without the parade, vanity, and temptations that generally adhere to riches." When Thomas was of a proper age, he was bound apprentice to a tradesman in London. In this situation he was remarkable for his diligence and activity, as well as for his amiable and obliging manners. With his master he usually attended the sermons of the celebrated Armenian preacher, Mr. John Goodwin; by this he became an early convert from Calvinism, in which he had been brought up, to the principles of Arminius. At the expiration of his apprenticeship he entered into business on his own account, with a capital of 100l. only, which in 1663 was increased by an addition of 500l. that he received with a citizen's daughter whom he married. By skill and industry he soon acquired property; but, what was of infinitely more importance, he became eminently known for the excellence of his dispositions; the integrity of his dealings, his solicitude to promote the happiness of others, and his kind and constant exertions for alleviating the miseries of the poor and unfortunate. He was, from his first commencement in business, desirous of obtaining the friendship of persons eminent for moral worth, foreigners as well as his own countrymen, and particularly of the clergy of different denominations. From these connections he, in future life, was enabled to derive essential assistance in promoting the benevolent and useful designs for which he afterwards became so eminently distinguished. Among other persons, he was intimately acquainted with Mr. John Biddle, who confirmed him in his Armenian sentiments, and made him a profyte to Unitarianism, for the fake of which Biddle himself was persecuted and banished. (See Biddle.) Firmin was not to be diverted from his kind intentions, because the tyranny of Cromwell fell heavily upon him: he shewed him every attention while here; and when he was sent, by the protector, a prisoner to the Scilly isles, he procured for him a pension, which Cromwell had virtue enough to allow him to receive during his banishment. Mr. Firmin enrolled among his intimate friends Dr. Whitchoe, Dr. Worthington, Dr. Tilloton, and Dr. Wilkins. By the intercourse which he thus maintained with the clergy, and the great confidence placed in his judgment to recommend men of worth and abilities to offices for which they were adapted, he was enabled to serve the interests of many promising young preachers and scholars, who were candidates for lectureships, schools, &c. In the year 1664, Mr. Firmin, being a widower, married again; and with his wife he had a very considerable fortune. In 1666, his house was destroyed by the great fire of London; but his character as a tradesman was now so well known, that by the increase of business he soon repaired the loss which he sustained by that event, and might have amassed much property, had not his heart prompted him to devote a great proportion of his profits to benevolent and humane purposes. In the year 1676, he erected large premises, and established a linen manufacture, for the sake of affording employment to a number of poor children, who were useless to and a burden on, the community. Here he found constant work for many hundreds, who were either acquainted with the different branches of the business, or were willing to be instructed in them. The returns proved, as he expected, very inadequate to the expenses incurred; yet, from his own funds, and from the allusion which he obtained from well-disposed persons, he was enabled to bear the loss, and to give away occasional sums of money, more than their earnings, and to distribute fuel and clothing among the poor manufacturers in severe feasts. In the year 1678, he published "Proposals for employing the Poor, especially in and about the City of London, and for the Prevention of Begging, &c. in a Letter to a Friend." In this tract he describes the progress and good effects of his institution, and makes a number of valuable observations relative to the most proper means of providing for the necessities of the poor. After this he attempted to set up a woollen manufacture; but the losses which he sustained, through the ignorance of the persons employed, obliged him to relinquish his project. He erected a large warehouse on the banks of the Thames, in which he deposited corn and coals, purchased in the cheapest feasons, to be sold at prime cost, in times of scarcity, to the poor. Mr. Firmin wassignalized by the zeal and activity which he displayed in liberating poor debtors from prison, and in providing for the more comfortable subsistence of others whom he was unable to redeem. He was, however, the means of opening the prison doors to many, whole families were ready to perils for want; and his recommendation and influence are said to have had great weight with some leading members of parliament, in the passing of certain acts of grace in behalf of poor debtors. Mr. Firmin was one of the governors of St. Thomas's hospital, and extremely active to render it as useful as possible: he was also a governor of Christ's hospital, of which he proved himself a great benefactor and benefactant. When the French protestants fled into England, to escape the perfecutions of Louis XIV., Mr. Firmin was active in providing for their relief; and several thousand pounds were entrusted to his care and management, for the benefit of the refugees. He was equally zealous in behalf of those who fled from Ireland to England, to escape the perfecutions of James II. He was, in short, a most affable and religious man; and in no instance did he stand by to witness oppression, without endeavouring to avert the rights of the oppressed. By the distribution of publications written in defence
defence of public freedom, he endeavoured to move his countrymen to a vindication of their rights, in opposition to the king (James II.); and he may be regarded as a zealous promoter of the revolution in 1688. After that event, he gave evidence that his benevolence was attached to no party, but was active in relieving those who were suffering for conscience sake. The high character which this excellent man sustained attracted the notice of the queen, who expressed a deep concern that so good a man was not orthodox in his religious sentiments; and intreated archbishop Tillotson to endeavour to convince him of his error. The prelate replied, that he had already made the attempt; but that Mr. Firmin had been too early and too deeply impressed with Unitarian principles, to admit now of contrary impressions. After this, Dr. Tillotson published some sermons on the points in dispute, and sent one of the first copies to Mr. Firmin, who immediately drew up an answer to them, which he presented to the archbishop: still, however, their friendship for one another did not abate. With Dr. Compton, bishop of London, Mr. Firmin was equally in favour; and it must not be forgotten, that the annual collections for the poor, which are made in and about London at Christmas, under the authority of the king's letter, were set on foot by Mr. Firmin, who had the direction of the business several years. This excellent man died, December 20th, 1697, in the 66th year of his age. He was interred, according to his own desire, in the cloisters belonging to Christ's hospital, where the following inscription was erected to his memory.

"Under that stone, near this place, lyeth the body of Thomas Firmin, late citizen of London, a governor of this and Saint Thomas's hospital; who, by the grace of God, was created in Christ Jesus to good works, wherein he was indefatigably industrious, and successfully provoked many others thereto; becoming also their almoner, visiting and relieving the poor at their houses, and in prisons, whence also he redeemed many. He set hundreds of them at work, to the expending of great stocks. He rebuilt, repaired, and added conveniences to hospitals, weekly over-seeing the orphans. The refugees from France and from Ireland have partaken largely of his charity, pains, and earnest solicitation for them. He was wonderfully zealous in every good work, beyond the example of any of our age. Thus showed he his faith by his works, and cannot reasonably be reproached for that which brought forth such plenty of good fruits." Life of Firmin in Unitarian Tracts, vol. v. 1866.

FIRM, in Geography, a town of France, in the department of the Rhône and Loire; 5 miles W. of St. Etienne.

FIRM, St., a town of France, in the department of the Higher Alps, and chief place of a canton, in the district of Gap: the place contains 831, and the canton 4477 inhabitants, on a territory of 2224 kilometres, and in 9 communes: 13 miles N. of Gap.

FIRM, Z, a town of Bohemia, in the circle of Leitmeritz; 8 miles N.W. of Leitmeritz.

FIRMNESS, FIRMITAS, in Philosophy, denotes the confidence of a body; or that state, wherein its sensible parts cohere, or are united together, so that the motion of one part induces a motion of the rest. In which sense, firmness stands opposed to fluidity.

Some authors confound firmness with density; as thinking the same state or property of body implied by both; or at least, that firmness follows density: but this is a mistake. For mercury, the densest body in nature excepting gold, is yet one of the most fluid; and even gold itself, with all its density, when fused, wants firmness, or cohesion.

Many of the Cartesians, and others, hold firmness to consist in the mere quiet of the particles of the body, and their mutual immediate contacts; urging, that a separation of parts can only arise from some matter interposed between them, which is excluded by the motion of contiguity.

But the insufficiency of this hypothesis is evident: for mere simple rett has no force, either to act or resist; and consequently two particles only joined by rett and contiguity, would never cohere so as that a motion of the one should induce a motion of the other. This is obvious in the case of two grains of sand, which, however contiguous, and at rest, will never constitute a firm coherent body.

The firmness of bodies, then, depends on the connexion or cohesion of their particles. Now, the cause of cohesion, sir I. Newton, and his followers, hold to be an attractive force, inherent in bodies, which binds the small particles thereof together; exerting itself only at, or extremely near, the points of contact, and vanishing at greater distances.

The firmness of bodies, therefore, follows the laws of the cohesion of bodies. See Cohesion.

Hence, firmness in all bodies must be as the surfaces and contacts of the component parts: thus a body, whose parts are by their peculiar shapes capable of the greatest contacts, is most firm; and that, whose parts are capable of the least contact, will be most soft.

In the former, the greatest requisite is to be as near to cubes as possible, and in the latter to spheres. And in the same manner are to be accounted for, not only all the intermediate degrees between the most firm and the most soft bodies, but those different consistencies, which are distinguished by other names, as friable, tenacious, glutinous, and the like; for the greater are the solidities of the component parts of any body, in proportion to their surfaces, though that body, by the aptitude of the contacts, may be what we call very hard; yet it will be most friable or brittle. And where the surfaces of the component particles are much extended upon a small quantity of matter, the bodies they compose, though they may be light and soft, yet they will be tenacious or glutinous; for although the flexibility of their compounding parts admits of their easy changing of figure by any external force, yet by their touching one another in so many points, they are very difficultly separated.

The former is the case in crystallized salts, refins, and the like; the latter in turpentine, gums, and all of that sort.

FIRMORE, a kind of lead-ore.

FIRMUM, in Ancient Geography, Ferma, a town of Italy, in Picenum, nearly S. of Potentia; situated at some distance from the sea. In the course of the Punic war, it sent succours to the Romans against Hannibal. It was taken by Totila, in the year 544.

FIROSAPOUR, in Geography, a town of Hindoostan, in Mewat; 13 miles W. of Cuttibah. See also Rousapour.

FIROUSABAD, a town of Peria, in the province of Mecran; 60 miles N.W. of Ernomal.

FIROUZABADI, Ibrahim Aboi Ishak, in Biography, a Persian doctor of high reputation for knowledge of the principles of the Mahometan law, who flourished in the eleventh century of the Christian era, and was born at Firouzabad, a town near Shiraz. Here and at Baflora he received the fundamental principles of his education. From Baflora
Bagdat, 38 ilill if or remembrancer, fmall and in Geography, Geography is the Ann. the 65 See lie fuch but ufually the his two (liarp fine but fhall term the term of firft-fruits and tenth, Queen Anne granted her royal charter, confirmed by flat. 2 Ann. cap. 11 whereby the the whole revenue of firft-fruits and tenth is vested in truftees for ever, to fhort a perpetual fund for the augmentation of poor livings, ufually called queen Anne's bounty. Blackf. Comm. vol. i. p. 284. &c. See Augmentation.

First-Fruits, Office of, is kept in the Temple, under the direction of a remembrancer, receiver, and comptroller, and their deputies and clerks.

FIRUZABAD, Firoozabad, or Giaur, in Geography, a town of Persia, in the province of Farifian; 65 miles S.S.W. of Shirms. N. lat. 28° 49'. L. long. 51° 58'. Also, a town of Persia, in the province of Trak; 12 miles W.N.W. of Ncvehvand.

FIRUZINUS Color, a term that frequently occurs in some of the old writers on gems, and has been mistaken by many to mean a ruddy brown; and by others, black; but these are not colours to be fought after among the gems, and yet it is to thefe that this epithet is ufually applied. We find it used for a blue kind of Jasper by fome authors, the fame with the Jasper known by Pliny and Dioscorides, and by others for the Laphire, which some of the ancients, particularly Theophratus, having called it μορφας, that is, black its deep colour, authors have been led to fuppofe that this word stood for black; but as there are not, nor ever were, any black sapphires, it is certain from this, as well as many other inftances, that the ancients ufed this word, μορφας, for a deep blue, and in that fene, furuzinus color does signify the fame thing; it being the aequinus color of the ancients, or what we call sky colour, or a true blue; such as the colour of the meft sapphires.

FIRUZKOH, in Geography, a fortress of Greater Buccharia, on the mountains that separate Balk from Segedian, taken in 1404, by Timur Tce; 30 miles S. of Gaur.

FIS, German, a sharp needle.

FISA, in Geography, a town of South America, in the province of Tucuman; 25 miles N.W. of St. Fernand.

FISANELLE, in Ornithology, a name given by the Venetians to a water-fowl of the columbus kind, called by authors the columbus major, or great diver. Very common in the markets of Italy. See COLUMBUS.

FISC, Fiscus, in the Civil Law, the treasury of a prince, or state; or that to which all things due to the public do fall.

The word is derived from the Greek αὐτός, a great bafket, ufed when they went to market.

By the civil law, none but a sovereign prince has a right to have a fice, or public treasury. See ΑΥΤΟΙΟΣ.

FISCAL, something relating to the pecuniary interest of the king, the public, or a private person.

The emperor Adrian ereded the office of fiscal advocate in the Roman empire.

FISCARD, or Fishcard, in Geography, a small market and nihing town in the hundred of Comlaws, Pembrokehire, South Wales, distant from London 15½ miles.
miles, and by the returns made under the population act, contained, in 1801, 344 houses, and 1505 inhabitants. The town is situated on the declivity of a high cliff, near where the river Gwayne, which separates the hundred of Cemmars from the hundred of Pebidrig, falls into the sea, forming a convenient road with good anchorage, vessels lying safely in five and six fathom water. The church is remarkable for little, but being definitee of a flepee. In the town are two other places of worship, one for baptists, and another for methodist dissenters. There are very few good houses, and the narrow, unpaved, filthy streets are strongly controlled, by the cottages being wholly white-washed, both walls and roofs. The town is however in an improving state, and lately it has received the advantages of a post office, and a weekly market held on Fridays, which is well supplied with corn and other provisions, cloth, flannels, &c.

Yet still its public accommodations are so few and indifferent, that Mr. Malkin's advice to travellers, "that they should aim to avoid pausing a night here," is still eligible. A road cut through a rock, forming a communication between the upper and lower parts of the town, opens a fine view to the bay. The harbour, having been recently filled by the erection of a pier, is of great advantage to the Irish trade, as Fieshord is the only port on this part of the Welsh coast, unaccommodated with those dangerous sands, denominated bars; and its situation to the north of Milford renders it a safe retreat for ships in blowing weather, unable to get round St. David's head. The port has a small coal trade, which employs about fifty vessels, from 20 to 100 tons burthen in the conveyance of butter and corn. A manufacture of coarse cloth is carried on in the town, but the principal part of the inhabitants is occupied in the herring-fisheries, quantities of which in the season are caught and dried here, particularly what are termed red herrings, by the process of smoking. Several smoking-houses are in the vicinity, and from being used for the purpose of drying, the fish are esteemed for their superior flavour. From the north-east wall of the church is a remarkable echo, which repeats sentences distinctly three times. In a dingle below the church is a strong chalybeate spring, celebrated for its sanative virtues; and between the church and the river is a vast stone, calculated to weigh more than nine tons, flat at top, measuring nine feet in diameter, and reposing upon three others placed in the ground, evidently one of those British Druidical monuments, denominated cromleches.

This place was brought into general notice a few years since, by the circumstance of two holliies frigates appearing off the port, and afterwards landing at Llaneno, in the neighbourhood, 1403 French invaders, who, after alarming the whole kingdom, and keeping possession of this part of the country a few days, were opposed by the sea-fencibles, and a troop of yeoman cavalry, amounting to 600 effective men, under the command of lord Cowdroy, to which inferior force, after a small resistance, they surrendered, and were marched prisoners to Haverfordwell. A curious incident on that occasion deserves notice. To the speedy and favourable termination of this, at first, formidable aggression, it appears the females contributed. Numbers assembled upon the surrounding heights, clad in their scarlet abitoles, (long mantles), and drawn up in ranks, the enemy took them for additional forces.

FISCSEL, a town of Spais, in Arragon; 15 miles N.W. of Ainfa.

FISCCELLUS MONS, Mount Fiscella, a mountain of Italy, between the country of the Sabines and Picenum.

FISCHAMUND, a town of Austria, situated at the junction of the river Fischa with the Danube; 12 miles E.S.E. of Vienna.

FISCHAUEN, a town of Pruffia, in the Frisch-hoff, anciently the residence of the bishop of Samland; 3 miles W. of Konigberg. N. lat. 55° 45'. E. long. 20° 2'.

FISCHBACH, the name given to several towns of Germany, in the bishopric of Bamberg, in the territory of Nuremberg, and in the principality of Bayreuth.—Also, a town of Swabia, in the county of Limburg.

FISCHBACH, or Fisf, a town of Switzerland, in the valley; 27 miles E. of Sion.

FISCHBRUN, a town of Germany, in the territory of Nuremberg; 4 miles N.E. of Herbruck.

FISCHER, JOHN CHRISTIAN, in Biographical, the most pleasing and perfect performer on the hautbois, and the most ingenious composer for that instrument that has ever delighted our country during full sixty years, that is to say, since Bastilla San Martini ceased to be heard. Fischer was born at Friiburg, and brought up at one of the common reading schools in a village in Bohemia, where all the children learn music, with reading and writing, as a thing of course. The first instrument put into his hands was the violin, but after he had made some progress in it, taking up the hautbois in sport, he fancied he could express his feelings better with the reed than the bow; he therefore attached himself to that instrument, and became, early in life, so excellent a performer on it, that he was appointed one of the king of Poland's celebrated band at Drefden. Here he remained till its dissolution, when he went to Berlin, without any intention of continuing there; however, arriving at a critical time, he was retained, and had the honour, during a month, to accompany his majesty, Frederic the late king of Prussia, alone, four hours every day. This circumstance was occasioned by an offence having been given by C. Ph. Em. Bach, who, in a letter with the rest of the band from Potzdam to Sans Souci in winter, had been so frightened by the badness of the road, as to exclaim to one of the household on his arrival, in rather strong terms: "tell our matter, sir, that no honour or profit will be a sufficient compensation to us for such dangerous service; and unless the roads are rendered safer, we (speaking in the name of the whole band), can come hither no more." It is true that the roads were very bad, and it is as true that Bach was extremely frightened in passing them. But cowardice sometimes is expedient; situations give a courage in remuneration, of which the greatest heroes are not in possession; for Bach's boldness in this particular not only surprised that of all his brethren, but of the most intrepid generals, and great captains in the Prussian army; none of whom, however they might have wished it, had the audacity to complain of this dangerous pass ere they could arrive at Sans Souci. But a court is at all times, and in all countries, of difficult access! The consequence of the transport that had escaped Bach was temporary disgrace and banishment from court; and this accounts for Fischer being the only musician allowed to accompany his Prussian majesty in his retirement and musical recreations. From Berlin he went to Mainz, to hear and be heard, and thence to Paris, where he performed at the "Concert Spirituel," and of the sensation which his performance produced there, an enthusiastic account is given in the Mercure de France. As Fischer, like Abel, was obliged to work his way hither by concerts, as soon as he had a little repaid his purde, he came over to England, where it was always his intention to settle, and where, as soon as he had been once heard in public, at a benefit concert, no other concert, public or private, was thought complete without his performance; and being engaged to play a concerto every night at Vauxhall, he drew together all layers of
music, but particularly professors, among whom the elder Park, who played the hautbois at Drury Lane theatre, used to quit his post, and for it half his night's salary in order to run to Vauxhall to hear him; which he did not profitably, for no tonic approaches bear near to that of Fischer, his richets and powers, that of the elder Park.

When the queen's band was formed, Fischer was appointed one of her majesty's chamber musicians; and when Bach and Abel, writing, established a weekly subscription concert at Hanover-square, where, for a long time, no music was heard but that of these excellent masters. Fischer was allowed to compose for himself, and in a style so new and fancifal, that in point of invention, as well as tone, taste, expression, and niceness of execution, his piece was always regarded as one of the highest treats of the night, and heard with proportionate rapture. Here Cramer, Caffelli, Corvetto, and other eminent professors, established their reputation, and by every new performance mounted still higher in the favour of the public.

In all musical performances at the universities, the triennial meetings at Wouccler, Henford, and Gloucester, at Salisbury, Winchester, and other provincial towns, Fischer's concertos were eagerly expected and heard with rapture. Fischer's tone was not only uncommonly sweet, but so powerful, that Giraldi, who never could praise a German but through the medium of shafts, used to say that he had such an influence of tone as no other instrument could contend with. Then his execution was quite as much as the instrument would bear to produce an agreeable effect. His taste and chiro-teno were exquisite, and he had his reed under such command, as more seldom to canarder or cackle like a duck, than any player we ever heard. And as to his composition, though it was inimitated by Bach and Abel that he had not studied regularly, and was no very profound theorist, he was always to original, interesting and pleasing, that he may be pronounced one of the few intuitive musicians who had powers which he knew not how he acquired, and talents at which study alone can never arrive.

A certain musical traveller has drawn a parallel between the performance of Fischer and Berozzi of Dröfden, nephew to the two celebrated Berozzi of Turin, on hearing him play a very difficult concerto on the hautbois in a very pleasing and matterly manner: owning, at the same time, that the less he thought of Fischer, the more he was delighted with Berozzi. However, he tried to discriminate, and to discover in what each differed from the other; and first, Fischer seemed the most natural, pleasing, and original writer of the two for the hautbois, and was the more certain of his reed; whether from being in less constant practice, or from the greater difficulty of the passage, he knew not; failed Berozzi in rapid divisions, more frequently than Fischer; however, Berozzi's swell, or mezza di voce, was prodigious; indeed he continued to augment the force of a tone to much, and so long, that it was hardly possible not to fear for his lungs.

His taste and cor were exceeding delicate and refined; and he seemed to possess a happy and peculiar faculty of tempering a continued tone to different dates, according to their several relations: upon the whole, his performance was so capitol, that a hearer must be extremely faditious not to receive from it a great degree of pleasure.

Fischer left England in 1756, and in the beginning of the next year had not been heard of. His majesty enquired several times, with some solicitude, whether he had written to any of his friends in England, and was answered in the negative; one of them understood, by report, that he was at Stralsburg. He returned, however, at the end of 1777, and continued in England during the rest of his life. About the year 1777, he had married a daughter of the admirable painter, Gaspariform, an enthuasist lover of good music and performance, and of some to such as Fischer's; indeed he enounced the whole family with his friends, and were beyond measure captivating, and it stood so well at his instrument, that his figure had all the grace of a Titan at the altar of Apollo. But, alas! something else besides a fine figure and fine music are necessary to constitute domestic happiness. The marriage was not auspicious; the minds were not in tune together, the temperaments were different, and the coincidence too infrequent to produce harmony. But we wish not to "draw their frailties from their dear abode;" she had external beauty, grace, and accomplishments; but he, with a good person, and superior genius for his art, was extremely deficient in colloquial eloquence, and in all those undebatable charms of conversation which engage the attention, and educe the speaker. He had not a grain of sense but what he breathed through his reed; he never spoke more than three words at a time, and those were negatives or affirmatives. But peace to his ashes. Though he had few charms for a friend or companion, he delighted the public at large in a higher degree than is allowed to any but gifted mortals. This admirable musician was feized with an apoplectic fit during the performance of a solo at the queen's house, at his majesty's concert. Prince William of Gloucester, observing his situation, supported himself out of the apartment, whence he was conveyed to his residence in Compton-street, Sobb, where he expired about an hour afterwards.

FISCHER, John Andrew, a physician of Erfurt, was born on the 28th of November, 1657; his father was a celebrated apothecary of that place. He graduated in the university of his native city, in April, 1691. He was appointed professor extraordinary in the faculty of Erfurt in 1695, and professor of logic in the Evangelical College in 1699; but he relinquished both these appointments in 1718, in order to assume the duties of the professorship of pathology and of the practice of medicine, to which he had been nominated three years before. Fischer acquired considerable reputation at Erfurt, and in the courts in the vicinity of that city. He had been ten years physician to the court of Mayence, when he died on the 13th of February 1729.

He left several essays in the form of inaugural theses; which were published between the year 1718, and that of his death; but he was also author of some more important works: viz. 1. "Consilia Medica, quæ in ulam præceptum et forensem, pro fepe curandi et renunciandi adorea in fine". Three volumes of this work were published successively at Frankfort, in the years 1704, 1706, and 1712. 2. "His in acu, sed Medicina Synoptica," Erfurt, 1716—17. 3. "Responsa Præstæ," Leipzie, 1719. —Eloe. Fischer, in Geography, a town of the duchy of Carniola; 17 miles S.E. of Steine.

FISCHERLIN, in Ornithology, a name given by many of the northern nations to a small species of the larus or gull, called by Mr. Ray larus pigitus, by Linnaeus larus minutus, and in the English, the solitary sea-swalower. See Larus.

FISCHGEYER, a name given to the false rufus; which see.

FISCHIARE, Ital. to bits. Fischità, bitful. FISCHIETTO, Ital. a whistle, a bits, a cat-cull. FISCHOTTER, in Zoology, a name given by Ridinger to the minutus; which see.

FISGARD. See Fisgard.

FISH, in Zoology, a class of animals which have either a naked or fealy body, always having fins, but without feet. For a further description of the characters of this class, and of
of the different orders into which it is distributed; see Precis. See also Ichthyology.

Fish, or Fishes, Anatomy of, has engaged much of the attention of physiologists, on account of its affording many examples of organs on a simple plan, or palpable scale, which in other animals poises either an obscure or minute structure. The brain, the car, the organ of feeding, the digestive and absorbent system, have been especially studied in two classes, with the view of illustrating their anatomy and functions in other creatures.

The continual residence and progression of fishes in fresh water necessitate peculiarities in their organs of motion, as well as a different mode of expunging the blood to the influence of the air, and consequently a different arrangement of the circulatory vessels than is usually met with in other animals; these parts of the anatomy of fishes are instructive both to the natural historian and to the physiologist.

The very extraordinary property which some fishes possess of communicating an electric shock, forms one of the most interesting subjects in the history of the animal economy.

In composing the present article, we have drawn our information, as far as our opportunities permitted, from actual dissection and observation; frequent references to the writings of other anatomists are therefore not introduced. It is necessary, however, to acknowledge, that we have derived great assistance from the comprehensive syllisem of M. Cuvier, particularly with respect to the anatomy of the rare and exotic species of fishes; and that we are indebted for several interesting facts to the very valuable, though copious, work, of Professor Blumenbach on comparative anatomy, translated by Mr. Lawrence.

Organ concerned in the exercise of the vital functions.

The mouth and its contained parts.—The position of the mouth of fishes is somewhat various. It may be stated generally, that it is situated in the front on the elongated, in the 

_Without the context, the rest of the document appears to be a continuation of the previous text, discussing the anatomy of fish, their unique features, and the role of the mouth in their feeding and respiratory processes. The text implies a detailed examination of various fish species, their physiological adaptations, and the importance of the mouth in their overall anatomy._

The mouth is a crucial organ in the feeding process of fishes, allowing for the ingestion of food. Different fish species have evolved unique mouth structures to suit their diet and habitat. For instance, some species have broad mouths to filter plankton, while others have elongated mouths for capturing larger prey. The internal surface of the mouth can be intricate, with various teeth and structures adapted for specific feeding habits.
FISH.

has, however, established four principal forms to which he thinks all the others may be referred: the first are the book-shaped teeth, which have sharp points bent towards the back part of the mouth; these are usually of a small size, and are very numerous, they are by the moll common: moll fishes have them in some part of the mouth. The second kind of teeth are truly conical in their form; the anterior teeth of the anarrhichas lupus afford the best examples of these. The third have the crowns either flat or blunt, and rounded; the pharyngeal teeth of the 

Cuvier in the fourth division of Cuvier includes the teeth with a cutting edge, or the wedge-shaped; these may either have the edge plain, as in the plaice (placentes platysis), or denticulated, as in the tench.

Different species of teeth frequently exist in different parts of the mouth in the same fish; thus, the genera teuthis, osaerion, and bolistes, have hook-shaped teeth posteriorly, and incisive in the front of the mouth. In the anarrhichas lupus, and some of the genus farrus, there are hook-shaped teeth behind; plates or flat-crowned in the middle of the mouth, and conical teeth before; the farrus foepar, and some others, have the front teeth incisive, the middle flat-crowned, and the afterhook-shaped.

Cuvier has given a description of the form and situation of the teeth in moll of the principal genera of fishes; but, as much minuteness or detail on this subject cannot prove interesting in an anatomical point of view, we shall confine ourselves to the more striking variations in the teeth of fishes.

In the genus raia the jaws are bifid with a number of teeth arranged in the manner of a pavement; these are usually of the same size, and disposed in squares closely set to each other. In some species, especially in the foreign rays, the middle teeth are the largest, and run in bands across the jaws: in some of these also this pavement of teeth is prolonged towards the palate; in the torpeda, and some other species of raia, each of the teeth is elevated in the middle into a spine or sharp point.

In the farrus genus (farrus) there are several rows of teeth; those of the front row are the largest and oldest, and stand up on the jaw; the succeeding rows are of later growth, and are laid down with their points turned towards the mouth; the number of the rows that are turned towards varies even in the same species. The form of the teeth in this genus is usually that of a triangular plate; they are attached at their base, and the other edges are more or less denticulated or grooved.

Among the brachyodonti there is very considerable variety. The genera bolistes and osaerion have eight teeth upon each jaw; in the former they are wedge-shaped, broad, and flat, and with oblique edges; in the latter they are compressed upon the sides. The pharynx of the bolesi is furnished above and below with two rows of fine, conic, close-fet teeth.

The lump fish (cyclus lupus) has one or two rows of small pointed teeth upon the jaws and the pharynx.

The frog-lit (lithos pikeatorius) has two rows on each jaw, a small one on each side of the palate, and the four plates of the pharynx furnished with tolerably strong hooked teeth.

In the fpatulatrix there are a number of very minute teeth upon the jaws and lateral parts of the palate.

In the farrus (aciper) there are no teeth of any kind found.

In the chimera the lower jaw furnishes two naked projections, which are flattened and sharp-edged, and the upper jaw has two others of nearly a square figure, which correspond to these. In the palate there are two triangular effuse plates.

Cuvier thus describes the singular formation of the jaws, which supplies the place of teeth, in the genera farrus and tetricinus.

The lower jaw of a farrus presents two eminences, which are used for mastication, i.e., the border of the jaw, which is parabolic, and a round disk in the middle. A large canal runs in the interior of the bone, and separates the mass of the disk from that of the border, and transmits to both these parts their nerves and blood vessels. The triturating surface of the disk exhibits some transverse and parallel lines; on cutting it in a vertical direction each of the lines is perceived to be the termination of a plate or lamina, which ascends a little posteriorly from the canal to the disk. These laminae are all laid one upon the other, and by this process the superior lamina is most exposed to friction, and consequently the shortest. They are evidently also the oldest; they are hard and consolidated together, in proportion as they descend they are finer and more separate from each other. The lower do not reach the triturating surface, but are covered by the bone of the jaw; these are quite distinct from each other, and shew the original and partial structure of the plates.

Each of these lamina is divided by a fissure in its middle. The inferior and posterior surface is tolerably smooth, but the opposite one exhibits, when viewed through the microscope, an extremely fine net work of little canals; this is occasioned by the impressions left by vessels which have run upon it, and which have run from the large canal where the bafes of the laminae red; in fact, the parietes of the canal are preceded by an infinite number of small holes, which lead into the intervals between the laminae.

The border is also furnished with laminae which increase in an opposite order to those of the disk; the anterior lamina being inferior and of the latest growth. The laminae also are parallel with the surface of the masticating border. The first lamina which is used presents its flat surface, and is consequently entirely worn before the one which succeeds it. The description here given of the lower jaw of the farrus applies equally to the upper jaw, provided the names of the laminae are changed according to their different position, as superior for inferior, and vice versa.

The genus tetricinus resembles the farrus; in having the lamellated borders, but wants the triturating disk. Each of their jaws is divided into two pieces by a denticulated fissure.

Fig. 1. Plate I. Anatomy of Fishes, exhibits the lower jaw of a farrus, cut through longitudinally; a, the central plate, or triturating surface; b, the friction of the laminae; the edges of which constitute the triturating surface; c, the large canal through which the vessels and nerves of the laminae are transmitted; d, the border of the jaw; e, the lamina which forms it; f, a smaller canal for accommodating their vessels and nerves.

Among the apodous fishes, the anarrhichas lupus has the teeth of the front of the jaws very strong, and conical in their figure; those of the side, and on the vomer, form large hemispherical tubercles; the internal row of each palatine arch is similar to the second, and the external to the first; the pharynx is set with small conic teeth.

The murena helena has the teeth compressed, with thin edges, and sharp-pointed; those of the common eel and the conger (murena anguilla and the conger) are small, straight, strong, blunt, and close set; the first teeth of the vomer in the helena is at a distance from the others, which it also much exceeds in size.

The
The jagular order of fishes also exhibits considerable varieties in the form and number of the teeth.

The _blennius_ species has a very regular close row on each jaw of long narrow teeth; the _blennius_ also has beside a strong hooked tooth placed at the back part of each jaw. The _trachinus draco_ possesses teeth in all the different situations except the tongue; they are very minute and close-set resembling the pile of velvet.

The _urolophus_ species has twelve or fourteen teeth, of hook-like, on the lower jaw, and numerous minute teeth on the upper jaw and pharynx, and two little lateral plates on the fore-part of the vomer.

In the _blennius_ species there is perhaps still greater variety than in the preceding orders; the individuals of the same genus often differing from each other.

The _flying gunnard_ (trigla volitans) has only small blunt tubercular teeth upon the jaws; the _armed gunnard_ (trigla cataphracts) has some close-set teeth, like villi, upon the branchial arches and vomer, and none at any other place. The _common gunnards_ have fine teeth upon the jaws and branchiæ, and a little plate on the anterior part of the vomer.

The _dog_ ( _cyprinus_ ) has some small hooked teeth upon each jaw, the vomer, and the branchial arches. The _ear_ _vomer_ has on the lower jaw only a row of teeth, so fine as scarcely to be felt.

In the genus _pleuronectes_ there is considerable variety with respect to the form and situation of the teeth.

The _chetodon_ have upon the jaws long, fine, fetaceous teeth, like the bristles of a brush.

The pharyngeal teeth of the genus _labrus_ are broad and hemispherical, and are disposed exactly like pavement; the anterior teeth vary in the different species.

The _labrus niloticus_, however, differs remarkably from the rest of the genus; the jaws are furnished with several rows of long, slender teeth, which have two or three points; the teeth of the pharynx are straight, flanger, sharp, and very long.

In the genus _paras_ , the lateral teeth of the jaws are arranged in the manner of a pavement, in two or more rows. In some species two of these teeth are distinguished from the rest by being larger, and of a more flattened oval figure; the anterior teeth vary much with respect to their form.

The _perch_, and the genus _babolobatus_, in general have numerous minute teeth, like villi, upon the two jaws, the anterior part of the vomer, each side of the palate, the tongue, and the pharynx.

The jaws of the genus _paras_ are naked, and project somewhat like the beak of a parrot; each mandible is divided by a middle line; the border is furnished with some little short cutting teeth, which are very closely applied to each other.

In the genus _ceola_ there is a single row of teeth to each jaw. Those of the lower jaw are remarkably spread out.

In the _abdominal order of fishes_, the genera _paras_ and _salmo_ exhibit great variety with respect to their teeth; in the latter genus particularly the differences are very remarkable.

The _salmo_ clarias has the teeth of the upper jaw straight, slender, and sharp, but those of the lower jaw are bent into the form of an overturned italic σ; they are long, compressed, and terminated by a point.

The _common salmons_ and _trouts_ (_salmo_ _fahari_, and _salmo_ _fario_) have hook-shaped teeth in all the parts of the mouth where they are met with in other fishes, and likewise upon the arches which form the external lip of these.

The _salmo_ _dente_ has ten or twelve large hook-shaped teeth upon the jaws; those of the pharynx are fine, like villets.

The _salmo_ _negro_ has the maxillary teeth facetaceous, like those of the _obtusodon_, but forked at the extremity, and the pharynx covered like velvet.

The maxillary teeth of the _niloticus_ _salmon_ are thick and truncated, and have the crowns furnished with two or three conical tubercles, like the molar teeth of some quadrupeds.

The _sera_ _salmo_ of _La Cépéd_ has ten or twelve teeth on each of the jaws, in the form of sharp wedges, with three or five notches on the edge.

The jaws of the _salmo_ _rhomboides_ have very small, short, flexible, facetaceous teeth.

None of the last mentioned five species have the interior of the mouth furnished with teeth in the same manner as the _common salmons_ and _trouts_.

The whole of the genus _cyprinus_ possesses only teeth in the pharynx. The superior pharyngeal bone presents a single plate; and the two inferior bones of the pharynx are each furnished with very thick, strong teeth, which vary in numbers and form in the different species.

The _carp_ ( _cyprinus carp_ ) has four or five of these teeth; the three or four posterior and superior of which are flattened and transversely grooved; the one most anterior is round, with a little point in the middle.

Other species of _cyprinus_, as the _auratus_, the _bipunctatus_, the _bream_, _tench_, and _rud_, have the teeth compressed, and their edge applied obliquely to the superior pharyngeal bone.

The _barbel_ ( _cyprinus barbus_ ) has nine pharyngeal teeth, four below, three in the middle, and two above; they are club-shaped, and end in points a little bent.

The _cyprinus_ _obulus_ has seven teeth in two rows, all pointed, and a little like hooks.

The _cyprinus_ _nuptus_ has twenty-one compressed teeth.

In the _niloticus_ _carp_ there are eleven of these, the points of which are worn down by friction against the plate of the superior pharyngeal bone.

The _genus_ _efox_ are well supplied with teeth. The _common efox_ (_efox lucus_ ) has teeth in all the parts of the mouth where they are found in other fishes; those of the lower jaw are tubercular, the others are hook-shaped, and the _efox_ _lurie_ has the maxillary teeth strong, hook-shaped, and in one row; it wants the lingual teeth.

There are three different structures to be observed in the teeth of fishes.

The first kind of structure exists in the conic and hook-shaped teeth, which are generally found in the inoffensive fishes; their teeth are implan ted in alveoli, as the teeth of mam malia; they consist of inoffensive substances, covered externally by a layer of enamel: after the eruption of the crown or external part, the roots of their teeth become anchyloped with the bone which contains them so firmly, that they cannot be separated without a fracture of the latter. The growth of the teeth situated in sockets is effected by the development of internal inoffensive layers.

The ground kind of structure is found in the teeth of the genus _speratus_. These are not immediately connected with the gums, but are contained in the gums, or soft parts covering them. They increase in the manner of the epiphyses of bones; their inoffensive part is at first soft and porous, and afterwards acquires throughout the density and hardness of ivory.

The third form of structure belongs to the flat or blunt teeth,
teeth, which are arranged in the manner of a pavement, as with the jaws in the ray genus, and in the palates of several other fishes. They are composed of a number of minute ossaceous tubes, arranged in the direction of the teeth, intimately connected together, and covered upon their external extremities by a common layer of enamel. From this structure Cuvier has distinguished these teeth by the term compound. They are not implaned in the substance of the bone, but adhere to the membrane which covers it; they evidently, however, consist of two parts corresponding to the root and crown; the former is marked by regular and close furrows, and contains a number of pores, which receive and transmit the nerves and blood vessels of the teeth; the tubes of the crown are more dense in their structure than the rest of the teeth.

The jaws of the anarrhichas lug宿 are furnished with a number of dentiform eminences, which are composed of ossous tubes, or fibres that run from the hinge to every point of the surface. The base adheres to the jaw by its circumference only; this circumference exhibits many foramina, through which the vessels and nerves pass to the tubes when in a state of growth. All these eminences are placed upon a substance much more fleshy than the rest of the jaw, which serves as the medium by which they are united. On the middle of each eminence a little tooth grows, but is cast off very early, so that, except when the fish is young, the uniform eminences alone seem to supply the place of teeth.

Fig. 2. of Plate 1. of the Anatomy of Fishes: a is the dentiform eminence; b, the small teeth on it. Fig. 3. of Plate 1. shows the surface on which the eminence is fixed.

The triturating surfaces of the jaws in the genera diodon and tetraodon might be considered as compound teeth; the laminae are analogous to the tubes, and are covered, like them, by enamel.

The mode of Jesseion of the teeth of fishes varies according to their structure. Those that grow in sockets are replaced by others which form at their roots, when the root of the old tooth becomes consolidated with the foot which contains it; it is nourished like the root of the bone, and acquires a cellular structure, which it did not originally possess. In proportion as the new tooth increases, the substance of the jaw grows into the cavity of the old one, which it fills up to the crown. This then separates from the root of its bone by a regular fracture which exhibits some radiated lines.

The new teeth in many species penetrate the cellular ossaneous substance, which fills up the cavity of the root, and exactly occupies the situation of the tooth that as cast off. In the large, pointed teeth, such as those of the genus oxus, &c., the eruption of the new tooth is on the side of the one that is shed.

In the anarrhichas lug宿, not only the teeth are shed, but those singular eminences on which they grow are also cast off, and replaced by others. These eminences appear to resemble in structure and mode of growth the horns of the deer; they are lined precisely in the same manner; to the which succeed grow on the side of the eminences they replace, and do not, until they increase in size, fill the vacancy left by the latter.

When the bony teeth of the rays are lost they appear to be replaced by others, which grow in the same situation.

The cutting teeth of the eel, as already mentioned, are in several rows. the anterior of which only is used by the animal; the posterior rows are of successive growths, and are designed to fill up the place of those in the front row, in the same manner, as the venous teeth of surfetes are succeeded by those of a later growth situated behind.

The laminae which compose the triturating surface of the jaws of the diodon and tetraodon are replaced in a manner analogous to the cutting teeth of the eel; these laminae grow and come into use successively, by which means the masticating surface is always preferred.

In the genus larus the teeth are replaced by others growing from behind, but which do not make their appearance until they are wanted. On examining the jaws of one of this genus, a number of tubercles are observed on the front part, which are the remains or roots of the teeth that have been worn down; and in the jaw is divided, a multitude of the germs of teeth will be discovered internally, which are afterwards to come into use.

The mechanism of the jaws, the small size and immobility of the tongue, the want of movable glands, and the small and position of the teeth, in fishes, all conspire to point out the manner in which these animals take their food, and that they do not, but with very few exceptions, make it, or even in any degree divide it previous to its being received into the pharynx.

Pharynx and esophagus.

The pharynx of fishes is rather distinguished from the rest of the esophagus by analogy of situation, and for the convenience of description, than from any resemblance it bears to the pharynx of mammals.

The passage from the posterior part of the mouth into the esophagus is diminished by the existence of certain bones, which are attached to the bases of the branchial arches, and enter into the composition of the palettes of the commencement of the air canal.

These are very properly called the pharyngeal bones; they are usually bevelled with teeth, as already mentioned; the left branchial arches and the pharyngeal bones can be approached by certain musculi, so as nearly, if not entirely, to shut up the communication between the mouth and esophagus: immediately behind the branchial arches and pharyngeal bones there is a very strong sphincter muscle, which surrounds the origin of the esophagus, and appears to be the continuation of those fibres which clothe the branchial arches. This muscle seems to have the power of perfectly shutting the pharynx. The design of the pharynx is evidently to enable the fish to convey its prey, without any preparation, and while it is still alive, into the pharynx. The teeth invented on the pharyngeal bones, and on the inside of the branch decreased are well calculated for assisting in this operation: to understand the effect of the teeth of a fish in the act of deglutition, it is only necessary to introduce the hand into the back part of the mouth, even after the animal is dead, when it will be found that the retreat of the hand is opposed by the points of a number of teeth at all sides. The construction of the interior parts of the mouth and pharynx appears to be entirely subserveint in fishes to the performance of deglutition.

In Plate 1. of the Anatomy of Fishes, Fig. 4. exhibits a view of the back part of the mouth or pharynx of the carp (cyprinus carpio): a, the inferior pharyngeal bones which with strong grinding teeth; b, the superior pharyngeal bones with flat surfaces; c, the inferior palatine of the mouth; d, the tongue; e, the branchial arches of each side; f, the aperture left between these parts which leads into the esophagus.

The esophagus of fishes is commonly very short; in some influences the mouth is almost to be luted to open into the esophagus; it is by no means unfrequent, on separating the jaws of a fish extensively, to bring into view the contents of that cavity.

The
The oesophagus is generally very wide, often of the same capacity as the stom-ach itself. A free passage into the stom-ach becomes necessary to those animals, on account of the size of the fishes they prey upon, and their voracity in catching them. Fishes rush upon whatever appears to be their prey impetuously, and sometimes without discrimination. In this manner they sometimes swallow other fishes that are not their proper food. We lately took a large flounder out of the stomach of a dog (Nass fischer), which bore all the marks of having refilled three times; it was from a knowledge of the rapacious habits of this fish, in fact, St. Peter's taking the tribute money out of its mouth probably originated.

The oesophagus is covered internally, as in other animals, by cuticle, which terminates abruptly at the stomach in some fishes; this is not perceptible; in which cases it is difficult to determine exactly the limits of these two portions of the alimentary canal. The internal membrane is usually white and smooth, and forms some longitudinal wrinkles, folds, or fricule. In severa of the rays and sharks genera this structure is very evident, although Cuvier describes the internal surface of the oesophagus and stomach in fishes to be alike. In the manta (rajus catvata) the difference between the structure of the oesophagus and that of the stomach is strikingly plain. In the dog-fish, the innermost line of the membrane of the oesophagus is numerous, prominent, and terminate in points which are directed backwards. These diminish the capacity of the canal, and thus serve to detain any fish the animal may swallow; but the most remarkable contrivance of this sort is that lately discovered by Mr. Home in the hakefish or hawk (fuguinus maximus). In this fish, in addition to the fricans observed in the other species of fuguinus, the oesophagus produces, around its termination in the stomach, a number of fringed processes, very much resembling thistle-knots; these appear to be muscular internally, and probably are capable of entirely closing the entrance of the oesophagus into the stomach. In fig. 5 of Plate 1. of the Anatomy of Fishes, the stomach and oesophagus of the basking fisk (fuguinus maximus) is represented upon a very reduced scale: a lheus the stipulated part of the oesophagus; b b, the fringed termination of that canal.

In the flatfishes, the parietes of the oesophagus have three strong longitudinal rugae, and some others between them of a smaller size. In the flataen (fuguinus platessa), the internal membrane produces spines like thole of the dog-fish, which, when minutely examined, are seen to be articulated upon the surface. The fuguinus pelagius, and fuguinus fuguinus, have long-lungitudinal folds in the oesophagus. The latter is likewise an oesophagus of some length: at the place where it joins the stomach, it forms a conical process or cul-de-sac of a conical figure, the end of which is terminated forward.

In the offation echidus, and some other fishes, there is a circular fold of the internal membrane, which clearly marks out the termination of the oesophagus; in other instances, this part may be distinguished from the stomach by the strength and arrangement of its muscular fibres, but in every instance, if the blood-veins of these parts have been previously injected with a coloured fluid, there will be no difficulty in determining which is the oesophagus and which is the stomach, the former being always less vascular.

The oesophagus in fishes is particularly well supplied with mucus, to facilitate the passage of the body through it: this mucus is furnished by follicular glands, which are situated behind the internal membrane; they are more numerous in some fishes than others; we have found them very plain and arranged in clusters round the oesophagus of the mullet.

There is on the oesophagus of the toadfish a very remarkable glandular apparatus for the secretion of mucus.

Of the Abdominal Cavity.

The abdomen of fishes is a distinct cavity containing only the vitals proper to that part; it differs therefore from the common cavity of the body in birds and reptiles; it however usually occupies the greater part of the trunk in fishes in which it is so remarkable the abdomen of mammals. Its parietes are chiefly composed of the portion of the great lateral muscles which are spread upon the under side of the body, the ribs being too short in fishes to form a frame for the abdomen; the cavity is everywhere covered with peritoneum, except next the spine, where it membrane is reflected across the air-bladder and kidneys, leaving these parts on the outside of the peritoneum. The folds of this membrane, which embrace the different abdominal viscera, are very thin, but the part which forms the abdomen is sufficiently strong.

In the moon fish (latrunculus melas), and in many other teleosts, it is flatted by Cuvier to be thick, flat, and as it were gelatinous: although in the flataen, and others of the branchiostegi, its texture is firm and does us looking.

The portion of peritoneum which lines the muscular parietes of the cavity very inquately-partakes of the colour of the external surface of the body, in consequence of there being a pigment placed behind it. In the platy (pharyngodon platessa) the two most of different colours, composing to one brown and white sides of the body in that fish.

In five fishes there are processes of the peritoneum which go on each side of the intercostal bones of the ten under the lateral muscles; these form faces for containing usually the organs of generation and part of the kidneys, and in some instances a convolution of the intestines, thus the bag which goes out on the dark side of the fisk receives a long coil of the intestinal canal.

There are some very remarkable circumstances to be noticed in the abdomen of the ray kind and the flataen (mappa): there have long been observed in the former two orders, one on each side of the anus, which lead by a short oblique canal into the cavity of the abdomen; they are wide enough to admit a goad equal to a large fisk, but contain within them a semicular fold, which acts as a valve in obstructing the passage of the water into the abdomen, but does not prevent fluids to pass out of this cavity. Doctor Monroe, who ascertained the discovery of these folds, was inclined to suppose that the sea water occasionally was admitted by them: he says, 'the great quantity, and evidently salt taste of the liquor of the abdomen, led him to look for passages by which the sea water might get into the cavity.' In one instance, he held the fish in a vessel, when he found that it contained about one forming to part of salt, which, however, he admits to be not much: the quantity that exists in common sea water.

"Fishers," he says, "I discovered that in the flataen, the bottom of the peritoneum is lengthened into the base of a funnel which divides into two branches which arise and convey to the lower part of the eulo agas. and open into the cavity of the abdomen from the obliquity of these branches, and their intimate adhesion to the oesophagus: neither water can be forced into them from the abdomen. Hence, while we suppose that in the living animal they take up fluids from the abdomen, in the way our partial flataen by the tuber, this is highly improbable: we must conclude that they serve to convey the liquor containing the cavity of the abdomen."

In the flataen (mappa bran.) Doctor Monroe has also described...
described and figured two openings near the anus, similar to those found in the fluke, and further, he discovered in the _anguilla_ a large minuminous funnel, situated upon each kidney, into the middle of the pelvis of which its bottom opens by a wide orifice. "We can live half or no doubt," he says, "that the lumen of the abdomen of the _anguilla_ passes into the pelvis of the kidney, for we cannot suppose that the urine passes through the holes decribed into the cavity of the abdomen, as the pelvis has large openings into the common cloaca, as in other fishes." (Monroe, loc. cit.) He concludes by expressing his opinion, that the design of the holes on the side of the anus is to admit the sea water, and that the funnels connected with the kidney are for the purpose of discharging it again. From the circumstance of the water of the abdomen containing so much salt felt than sea water, and even less than that found within the cranium of fishes, which is a salt cavity, he is disposed to admit it is in part a secretion from the arteries. In our opinion, it appears more reasonable and consonant with general analogy to suppose, that all the fluids moistening the cavities of these fishes are produced in the usual way, and that the openings are merely for carrying the superabundant liquor out of the body, than to imagine that an extraneous fluid should be admitted as the fluid placed of peculiar secretion; considering the matter in either point of view. In the second place, however, the anatomical fact of a communication between the interior cavities of the body and the external element, is not only highly curious, but without example in any other class of animals.

**Stomach.**

This cavity is commonly situated immediately behind the septum which separates the heart and branchiate from the abdominal venules to which it is attached, as well as to the surrounding parts by reflexions of peritoneum.

The form which the stomach of fishes most commonly possess has been very aptly compared to the head of the chemical vessel, called an alembic, supposing it to be inverted and a little elongated; the large opening correponds to the oesophagus; the small or lateral part to the contracted portion, which ends at the pylorus, and the bottom to the cul-de-sac of the stomach. The more common deviations are produced by the bottom of the cul-de-sac, or caecal portion of the stomach, being either longer or shorter than what has been described, or it being formed by a conic or cylindrical shape. There are also other varieties in the figure of this viscus which will be noticed in the following description.

The muscular coat of the stomach varies very much in thickness, and likewise with respect to the distinctness and arrangement of its fibres.

Between the muscular and internal coats there is often found a layer of mucous follicles.

The internal membrane varies very much as to thickness, and its surface is either smooth, reticulated, or plicated.

The structure of the stomach in fishes does not correspond with any natural classification of these animals, and therefore does not admit of a systematic description.

The rays have the stomach nearly of the common form. There are some folds of the internal membrane; in the _nudilis_ (roga elevata) it is a thick spongy mass, which peels off easily after maceration. The irregularities of the surface look like the rugae of the human stomach, they are not however produced by the folding of the coat, but by the thinness or actual deficiency of some parts of it, we observed very thinly scattered over in these manner round the depressions which Mr. Home has conceived to be the glands for secreting the gallic juice; in this as well as other inferences these glands bear no sort of proportion to the quantity of the fluid which physiologists have hitherto supposed requisite for digestion.

The stomach in the _anguilla_ consists of two portions; the first is much longer and wider than the second, which is straight, and has the appearance of an intestine; the two portions communicate by a small opening, which will only permit substances to pass into the second stomach, that are reduced into a smooth and fluid state. There are well marked longitudinal rugae in the first stomach, but those in the second are but little apparent.

In the _anguilla_ (anguilla maximus) the first stomach is reticulated at the beginning, and towards the pylorus has very prominent, longitudinal folds, and there is a globular cavity interposed between the pylorus and the intestine, which communicates with each by a very contracted aperture.

In the greater dog-fish (sphyraena canicula) the muscular fibres of the stomach are mostly longitudinal; they are numerous at the cardiac and pyloric extremities, but not well marked elsewhere. The muscles of the stomach are much stronger in the _anguilla_ (anguilla plebei) than in many other species; they are extended over the whole of both portions; the stomach is almost circular. The internal membrane in this species forms large and numerous folds, which have different directions; behind the internal membrane of the large portion of the stomach there is a glandular layer of a greyish colour and some thickness.

The _anguilla_ has two fortes of rume in the first stomach; one are longitudinal, and lie parallel to each other; the second are transverse, and perpendicular to the first.

The internal membrane of the first portion of the stomach in the _anguilla_ (anguilla plebei) has twelve or fourteen very large longitudinal and parallel folds, which are grooved transversely; the second stomach in the same fish is perfectly smooth.

The stomach of the _anguilla_ (anguilla plebei) is not to be distinguished from the other parts of the alimentary canal, except from its situation.

In the _anguilla_ (anguilla plebei) the structure of the stomach is singular; after being prolonged for some way as a simple tube, it is bent so as to make a complete turn, it becomes contracted on this side of the pylorus, and then again forms an enlargement of a pyramidal figure, the base of which corres ponds to the pyloric opening; this enlargement is produced by a very thick muscle, the fibres of which run obliquely from without inwards; the pyloric orifice is very small, and bounded by a circular fold. The internal membrane is smooth and without villi, except at the part corresponding to the enlargement, at which place there are thin, long folds of a pyramidal figure, the bases of which touch the pylorus, and are covered with a new-work, similar to that in the cef phagus of this fish.

The stomach of the _anguilla_ (anguilla plebei) is very wide, and fills a great part of the abdominal cavity; it has a round figure, and forms a cul-de-sac which is not as usual in the direction of the oesophagus, this canal and the intestine opening near each other. The internal surface of the stomach is smooth; there is a circular valve at the pylorus.

In the _anguilla_ (anguilla plebei) the alimentary canal proceeds from the mouth to the anus, as in the _anguilla_ (anguilla plebei), without forming any convolution: the part which corresponds to the stomach, according to Cuvier, the one twentieth of the whole; it is distinguished from the rest by a slight convolution, and by two layers of muscle: the external layer is formed of circular fibres, which surround the stomach; the internal layer
layer is longitudinal. The internal membrane has some large longitudinal folds.

The stomach in the genus *labius*, and in the *schracans*, bears considerable resemblance to that of the *sphygus*. It has thick parites plicated internally, and is distinguished from the other parts of the canal by its thick muscular coat; in the *labius* there is a denticulated valve interposed between the stomach and intestines. In the *schracans cristaec*, the part corresponding to the stomach may be known by its form; its parites are thin, transparent, and wider than the rest of the canal; its internal membrane is smooth, except next the oesophagus, where it produces some waving folds; from that place the canal gradually diminishes, its coats become thicker, and the internal surface villous and plicated.

The form of the stomach in the *abyss triglaeas* is very different from the usual one in fishes. It is the shape of a globe, a little extended at the cephalical and pyloric orifices, which are situated exactly opposite each other; the one before and the other behind. The coats of the stomach are thin and weak, and apparently without muscular fibres; the internal surface does not present any inequalities, and the orifices are unfurnished with any valve.

Cuvier describes the stomach of the *lupius pectoralis* as a big, having the same capacity and direction as the oesophagus, and extending nearly the whole length of the abdominal cavity. The internal membrane is confounded with the cellular coat, is very thick, soft, and pulpy, and forms a great number of thin procresses and large irregularly shaped rugae; the first are particularly remarkable around the cardiac, where they seem to produce many glandular mucus, some of which extend into the oesophagus. There are further to be observed some little orifices of cells equally small, placed in the substance of the internal membrane, which appear to be designed for the secretion of mucus. The aperture of the pylorus is much contracted; it is surrounded by a very thin circular border, which projects considerably into the intestine. The mucular coat of the stomach is very strong at every part, its fibres are longitudinal.

In the *lump fish* (*pleurotus lumpus*) the figure of the stomach is nearly that of two ovals united at their ends; the angle formed by their junction corresponds to the cephalic portion of the stomach in other fishes, and the other ends receive the oesophagus and the intestine; the stomach is smooth upon the internal surface, except near the pylorus, at which place there are some pleats; it exhibits a number of opaque spots, which are occasioned by the union of very few laminae, circularly situated between the muscular and internal coats. They have each a small orifice in the centre, and appear to be destined to secrete the mucus of the stomach; the muscular coat is confined to the second oval part of the stomach, and near the cardiac orifice; the parities are in other places thin and transparent.

In the *eel* the cephalic portion of the stomach is very much elongated, and of a taper or funnel-shape; the pylorus is situated very near the oesophagus, and appears to be formed by two portions; one from the oesophagus, and the other from the elongated part of the stomach, from which it would appear that all the food does not in this fish pass through that part; the internal membrane produces some longitudinal pleats at the pylorus, which become less evident and wavering towards the bottom of the funnel part of the stomach. The fibres of the muscular coat are circular; although they are longitudinal on the oesophagus; there is a sheath of the internal membrane, which contracts the aperture of the pylorus.

The *conger* has very nearly the same form of stomach as the *common eel*; the prolonged part is, however, less taper, the Vol. XIV. muscular fibres are more curved, and the pylorus is bordered by a broad lamina; the internal membrane is firm and white, and forms a few long folds which extend from the oesophagus to the bottom of the cul-de-fac, or cephalic portion.

The *jugal* order of fishes afford many examples of the usual or proper figure of the stomach.

In the *trachinus draco* the stomach varies but little from the usual form; it is somewhat larger than the oesophagus, and its parities are thrown into a few irregular and oblique folds, which are visible even on the external surface.

The genus *gadus* does not afford much singularity in the formation of the stomach. The caudal (*gadus morhua*) has the cephalic portion very short, and, in other words, the part which goes to end in the intestine runs near the bottom of the stomach.

The *bake* (*gadus merlangus*) has this part placed forwards, and the cachalot (*gadus morlingus*) has it still more so.

The liver (*gadus morhua*) has the cul-de-fac much elongated, but without any alteration in its capacity. In all these fishes the part which ends in the intestine is much contracted.

Amongst the *thoracics* we observe the following varieties of structure in the stomach.

In the *father loisher* (*cottus scorpius*), and *bull head* (*cottus gobus*), the stomach is very muscular and of an irregular shape.

The cephalic portion is considerably larger than the oesophagus; the part which ends in the intestine is situated near the entrance of the oesophagus. In the *goby* of the *Nile* (*cytus niloticus*) the cephalic portion is smaller than the other parts of the stomach; and the intestine arises far from the oesophagus.

The stomach of the *septentor barida* resembles that of the *nilotic goby*.

In the *lyre* (*cellfomus lyre*) the cul-de-fac is formed immediately at the commencement of the stomach, which is at first globular, and is afterwards contracted posteriorly to nearly the size of the oesophagus; on the right side of the dilatation, the part which ends in the intestine goes off anteriorly; the valve of the pylorus is produced by the projection of that part of the stomach into the intestine.

In the *remora* the right part of the stomach has not, as in general, a small bowel arising from the side of the cul-de-fac, but a short prolongation of that part which is bent forwards, and forms an angle posteriorly. The muscular coat is very strong, and the internal furnished with very prominent longitudinal rugae.

The figure of the stomach differs very much in the different species of the genus *pleurostoma*.

In the *turbet* (*pleurostoma maximus*) the middle portion of the stomach is a little enlarged, but the cul-de-fac is very short; the pylorus being nearly at the bottom of the stomach; neither the figure given by Cuvier of the *turbet*’s stomach, nor that contained in Blainius *Anatomia Animalium*, is correct.

In the *pleurostoma lucius* the stomach is wide, irregularly round, with thin coats, and smooth on the external surface.

The stomach of the *sole* (*pleurostoma flabellum*) has a bent figure like a portion of an S; there is a slight dilatation at the greatest curvature, which takes the place of the usual cul-de-fac. There is no contract on the canal at the pylorus; the dilatation between the stomach and intestine, however, is marked both on the outside, and internally, by a whitish line; the inner surface is thrown into loose irregular longitudinal folds.

Cuvier describes the stomach of the *pike* (*pleurostoma plena*) as forming a continuous canal with the oesophagus and intestine; there is, however, always a degree of dilatation at one side of the stomach, which varies according as it may be defended by food; this corresponds to the con-
Cuvier states the stomach of the genus *Labrus* to possess the ordinary form and structure. In the *gibbus verger* (*Labrus itaca*), however, we have found the cæophageus, stomach, and frill or small intestine, to make a continuous canal, without any material difference in capacity or in structure; each of these parts is rectituded upon the internal surface.

In the *perches* (*genus perca*) there is nothing in genera very peculiar to remark; the chief deviations from the common structure appear to be with respect to the length and form of the cæde-de-fac; this part is conical in the *perch* of the *Nile* (*perca nilotica*); it is deep in the *sea-perch*. *Blanes* gives a figure of the vilcera of the *perch*, in which the intestine appears continuous with the cæophageus, and the canal portior of the stomach is like a long bag, with a contracted neck.

In *the stickleback* (*gasterosteus pungitius*) the stomach is an oval figure, and without curvature.

The *red gurnard* (*trigla cuculus*) has the portion which ends in the intestine considerably enlarged.

The *piper* (*trigla lyra*) has the pylorus situated very near the cæophageus, which is straight. The body of the stomach is nearly of an oval shape, and the bottom of it forms a very short cæde-de-fac, less in diameter than the cæophageus.

In *the salmon* (*salmo salar*) the portion which arises from the body of the stomach to terminate in the intestine is an oval figure, and so large in proportion to the rectitude of the cavity, that it seems like a second stomach; its muscular coat is very strong, and the internal one has some thick longitudinal folds.

The *abdominal* fishes exhibit some more remarkable varieties in the structure of the stomach than the preceding orders.

In *the carp* (*cyprinus*) the stomach forms a continuous canal from the cæophageus to the intestine. In the *sea-pike* (*eœa belone*) also it cannot be distinguished from the adjoining parts of the alimentary canal; the stomach of the *common pike* (*eœa lucius*) forms no cæde-de-fac, the intestine going off at its bottom; but the situation of the pylorus is plainly marked by an annular constriction entirely, and by a circular fold of the internal membrane. The figure of the stomach is that of a very elongated bag, somewhat wider in the middle than the other parts; its muscular coat is strong; the internal membrane furnishes at frill some distinct longitudinal folds, which become numerous, and covered with papiller in the lower part of the bag.

In *the herring* (*clupea harenus*) the stomach at first paffes backwards, like the continuation of the cæophageus; it is then reflexed forwards, so as to form an acute angle with the first portion; the outside of this curvature produces a long, conical cæde-de-fac: the second portions are distinguishable by their structure, as well as their form; the frill has thick paires, and the internal surface plicated; the second has thin coats, and is smooth internally; the pylorus, which is the termination of the reflected portion, is much contractod.

The stomach forms a cæde-de-fac in the genus *salmo*, which, however, varies much with respect to its depth. In the *smelt* (*salmo eperlanus*) it is long and pointed, as in the *herring*. In *the common salmon* and *trout* (*salmo fario*) the cæcal portion of the stomach is very considerable. There is a kind of *trout*, found in the western part of Ireland, which, from the great strength and thickness of the muscular coat of its stomach, is commonly called the *gillaroo* or *gizzard* *trout*. It is not generally supposed to be a distinct species, but a variety of the *salmo fario*. Hunter states the paires of its stomach to be two-thirds thicker than those of the common *trout*; he did not, however, consider its stomach as serving the
the purposes, or as deserting the name of a gizzard; the internal surface is soft and villous, and therefore not fit for grinding the food; the contractions of the stomach are however sufficiently powerful to break the shell-fish on which this trout subsists, with the assistance of round, smooth floes, which are swallowed for the purpose. The common trout likewise takes floes into its stomach, with a similar design.

The stomach of the _fisculus bogre_ is an oval, or rather the shape of a flat, with a very wide mouth; its parietes are hard, strong, and thick; the portion which leads to the pylorus is short, and arises from the posterior third, which occasioned a considerable cul-de-sac.

There is no _cæcal_ portion of the stomach in the genus _murena_; that of the _anabipes tetraphthalmus_ is a canal curved upon itself, before it enters in the intestine, from which it is separated by a flight contraction, and a circular valve; the left side of the internal surface of the stomach exhibits thick folds, which form a net-work, apparently of a glandular structure; the other parts of the internal membrane are covered with fine villi.

Cuvier describes the _cæcal_ portion of the stomach, in the genus _mormyrus_, as being wide and short; we should rather say that the stomach is dilated into a bag, which lying transversely across the direction of the cæosophagus,resembles, in some degree, the form of this cavity in mammalia.

The most singularly constructed stomach in the whole class of fishes is met with in the mullet (genus _mugil_), of which Cuvier has given an imperfect description, and bad figure. In the common species (mugil _cephalus_), the stomach may be divided into three parts; the pylorus resembles in form and direction the cæosophagus, from which it commences; it leads to the back of a large muscular mass, into which it opens; the same canal is afterwards continued for a considerable way backwards, and is gradually contracted in capacity, until it finishes in a pointed blind extremity. The muscular mass has a figure not quite spherical, but such as would be produced by the application of two disks to each other; the largest diameter of it measures about an inch: the tubular part of the stomach opens into the centre of one disk; the intestine commences exactly opposite, or at the centre of the other; a straight canal leads directly through the muscle, which therefore corresponds to the pyloric portion of the stomach. It has, however, been considered by some zoologists, as an example of the true gizzard stomach in fishes, and not without foundation; the muscular fibres which compose the interior part of it are short, closely applied to each other, and interwoven so as to produce a mass nearly of an homogeneous structure; the fibres are more distinct on the external surface; they pass from the centre to the circumference, where they seem to coalesce with each other, and with a layer of muscle, which pallies round the mass as a ring: this arrangement of the muscular fibres bears some resemblance to that of the gizzard in birds, and certainly shews that the apparatus in the _mullet_ is capable of exerting an extraordinary degree of force. It should further be added, that the internal part of the muscular mass is lined with a cuticular coat of some strength: this is very easily detached by maceration, and is found to be confined, as in birds, merely to the grinding surface. As arguments against the supposition of the muscular apparatus in the _mullet_ performing the functions of a gizzard, it may be stated that the cavity it contains is too small to serve as a reserveroir for any quantity of food; that the cuticle is too weak to sustain the friction with hard bodies, and that the food must be in a great measure digested in the tubular portion of the stomach, before it passes into this. These objections we are disposed to allow to a certain extent; but that the aliment undergoes a further comminution and admixture, while moving through the muscular portion of the _mullet's_ stomach, we cannot entertain a doubt, both from the contemplation of the structure of the part, and of the intestines which succeed it, and from actual observation made upon its contents, immediately after the death of the animal.

Cuvier describes the stomach of the _white mullet_ (mugil _albula_), as differing only from that of the _mugil cephalus_, with respect to the shape of the cul-de-sac, and the muscular portion of the pylorus: the _mullet_ has the proper form of a bag, being wider at the lower part than above; the former is a figure of a globe, instead of being compressed or levelled on the inferior and upper surfaces.

The figures which illustrate the form and structure of the stomach are contained in Plate I. and II. of the _Anatomy of Fishes_. Fig. 5. of Plate I. exhibits a view of the stomach of the _baking shark_ (_dogfish maximus_) laid open on one side; _e_, the portion of the stomach next the cæosophagus, the inner surface of which is reticulated; _d, d_, the succeeding parts of the stomach, with longitudinal laminae or folds, which are particularly prominent near the pylorus; _e_, the purled, or contracted opening into the second stomach; _f_, the second stomach, partially seen behind the other; _g_, the commencement of the intestine; _b_, the biliary ducts, palling as a hard to the intestine; _j_, the spleen.

Fig. 6. of the same plate shews the globular cavity, or second stomach, and its communication with the first stomach and intestine: _a_, the external surface of the pyloric portion of the stomach; _b_, the intermediate cavity laid open, to bring into view the contracted aperture leading into the principal stomach, and the one into the intestine; _c_, the cavity of the first part of the intestine exposed; _d_, the commencement of the spiral valve; _e_, the projection into the intestine, upon which the small aperture of the second stomach is seen; _f_, the papilla, by which the biliary ducts terminate in the intestine; _g_, a portion of the spleen; _b_, twelve or thirteen biliary ducts, forming a single falciform, which proceeds to the intestine.

Fig. 7. of the same plate represents a portion of the stomach and cæosophagus of the _ruga _anchura_; _a_, the inner surface of the cæosophagus; _b_, the internal coat of the stomach, which is thick, soft, unequal, and, as it were, raised upon the surface of the other coats; the depressions seen upon it are produced by the deficiency of the internal coat itself; some small foramina are scattered over the surface, which are the glands supposed to furnish the gastric juice by Mr. Home, but which by others are commonly described as mucous glands.

In Plate II. of the _Anatomy of Fishes_, fig. 1. represents the stomach of the _tetraodon oblongus_; _a_, the cæosophagus; _b_, the beginning of the intestine; _c_, the stomach, of a globular figure. Fig. 2. shews the stomach of the _eel_ (muraena _anguilla_; _a_, the cæosophagus; _b_, the cul-de-sac, or _cæcal_ portion of the stomach of an elongated taper form; _e_, the intestine. Fig. 3. exhibits the stomach of the _sole_ (pleuronectes _solea_) which describes an S-like curve; _a_, the flight dilatation which corresponds to the cul-de-sac. Fig. 4. represents the stomach of the _plaice_ (pleuronectes _platea_); _a_, the cæosophagus; _b_, the inconsiderable dilatation which marks the situation of the stomach; _c_, the pylorus; _d, d_, the two short pyloric cæca; _e_, the single cæcum from the first portion of the intestine, as far as it is known, peculiar to this fish. Fig. 5. shews the stomach of the _obodon zebrus_; _a_, the cæophageal extremity; _b_, the pylorus; _c_, the portion of the stomach, corresponding to the cul-de-sac, which, in

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this
this species, is turned forwards. Fig. 6, is the stomach of the Sparus fœminus: a, the oesophageal extremity; b, the intine, of a small size, arising near the oesophagus; e, the body of the stomach, which forms a perfect bag. Fig. 7, is the stomach of the mullet ( Mugil cephalus); a is the part continued from the oesophagus; b, the funnel, or "cul-de-sac; e, the muscular portion, which has been compared to a gizzard, on which the arrangement of the muscular fibres is seen; d, the intine; ees, pyloric cæsæ. Fig. 8, shows the same stomach, with the muscular part cut through longitudinally; a, the oesophageal extremity; b, the funnel seen behind; e, the muscular portion, in the centre of which appears the opening, through which the food passes to the intine; d, the cuticle lining this passage, puckered or folded on itself.

Intines.

There are, properly speaking, but two intines in fishes; the first corresponds to the small, the second to the great; these terms, however, are not applicable to the divisions of the canal in this class of animals, unless they were reversed, as that which would be called the great is often less capacious than the other. Cuvier has called the second portion of the intines in fishes rectum, to which part it is certainly more analogous than to the colon, or cæcum, although sometimes it experiences a considerable and sudden enlargement. The first and second portions of the canal are commonly distinguished from each other by an annular projection of the internal coat, which is generally thick and rounded on the edge, and appears to contain some circular muscular fibres, which, by their contraction, will increase the valvular obstruction to the passage of substances from one intine into the other; these parts are further indicated by a different structure in the internal membrane, and commonly, also, by a different arrangement of the fibres in the muscular coat. The capacity of the second intine, as already mentioned, is almost always either smaller or larger than the preceding part of the canal; most commonly it is smaller. The internal structure, characteristic of each intine, is most strongly marked in the one next the pylorus, and in the other towards the anus.

The variation with respect to the form, length, and structure of the intines of different fishes, do not accord with the natural divisions of this class of animals; remarkable deviations being often found among individuals of the same genus, and even sometimes in varieties of the same species, as will appear by the following table, and in the description of these parts in the principal genera.

Table of the proportional Lengths of the Intestinal Canal in Fishes, Extracted from Cuvier's "Très ons d'Anatomius comparée, tom. 3."

<table>
<thead>
<tr>
<th>Names</th>
<th>Length of the body, from the end of the mouth to the extremity of the tail, without including the caudal fin.</th>
<th>Length of the intestinal canal, from the pylorus to the valvula of the rectum.</th>
<th>Length of the rectum, or second intine.</th>
<th>Total length of the intestinal canal.</th>
<th>Relation of the length of the body to that of the intestinal canal.</th>
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<tbody>
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<td>Lamprey</td>
<td>0.145</td>
<td>0.351</td>
<td>0.189(d)</td>
<td>0.636(a)</td>
<td>1.8 : 1</td>
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<tr>
<td>Ray</td>
<td>0.300</td>
<td>0.351</td>
<td>0.189(d)</td>
<td>0.636(a)</td>
<td>1.8 : 1</td>
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<td>Mullet</td>
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</table>

The numbers are divided into the following groups, according to the nature of the animals. The fish are placed in the following four orders, according to the description given by Cuvier: first, the lampreys; second, the true fishes; third, the cartilaginous fishes; fourth, the bony fishes.
(a) Measure of the alimentary canal, from the posterior parts of the mouth to the anus.

(b) Length, measured from the border of the lower jaw to the anus.

(c) Length taken from the end of the muzzle, but not including the leaf.

(d) Length measured from the end of the spiral valve to the anus.

In the lamprey (Petromyzon) the alimentary canal passes to the anus without anyensible dilatation or convolution; the abdominal cavity is however of considerable extent. The inner surface of the intinule is covered with fine longitudinal plicae; the reflection of peritremum, which corresponds to the mdeeneter, completely embraces the greatest part of the intinule, by being coiled upon it, in consequence of which it is allowed great latitude of motion in the abdomen.

The intinules of the ray and seahorse genera make no material convolutions, and appear remarkably short for the fish; the length, however, lost by this circumstance, is amply supplied by the structure of the first intinule; the internal membrane of which is converted into a spiral valve, which nearly fills up the canal from the pylorus to the commencement of the second intinule; the food, therefore, instead of passing freely to the anus, traverses a considerable circuit.

The spiral membrane is tolerably smooth upon its surface, but is extremely vascular; an injection of the blood vessels will render this part of a vivid red, and fearlessly show any effect upon the other parts of the alimentary canal. The valvular portion of the intinule in the Syphalus maximus terminates at the rectum in a foiliated appearance, resembling a rosy, by which the passage of the food is obstructed.

The second intinule of these fishes usually makes one or two slight curves; it has a smaller diameter and thinner coats than the preceding; the inner membrane is villous at the commencement. Cuvier has described a layer of a greyish, glandular substanee, as being interpolated between the muscular and internal coats; this has not been observed by us.

There is a remarkable glandular body connected by a slender tubular foot-folk with the rectum which is only met with in the ray and seahorse genera; in the former it is somewhere on the figure of the feed of a fish, with the lefleffar towards the intinule. We have observed it in the dogfish to be long, round, and pointed at the free extremity. Its substance is very dense and unyielding, resembling a good deal the texture of the human uterus; it contains a small cavity, which appears to have a smooth surface, but, if accurately examined, exhibits some cells or depressions, which would seem to be the orifice of mucous glands. In the Syphalus maximus, Mr. Hume found this gland deeply reticulated in the inner surface, and to contain a dark coloured glairy fluid. Doctor Monroe, in his Physiology of Fishes, called this body, from analogy of situation, appendix vermiformis, and supposed it to be designed to perform the same functions of that part in the human intinule. Cuvier, on the other hand, describes it amongst the anal glands of animals, to which clits of organs he thinks it most analogous. It appears to us to be a gland designed to supply the rectum with mucus.

In the Syphurus (Aegopis) all the parts of the intinule are extremely muscular; the internal surface is reticulated throughout the greatest portion of the canal; at the beginning the meshes are so deep as to produce cells; at some distance from the pylorus there arises a spiral valve, which is loth at nearly the same distance from the anus; its turns are much less frequent than those of the valve in the ray and dogfish. In the Syphurus it is sustained by a strong pillar which runs in the centre of the tube of the intinule, and which seems to be composed of muscule internally; the valve resembles flaps placed around a pillar, except that it is not unbrokenly attached to the centre, but rather coil upon it, leaving in some places the internal border at liberty, it does not form, therefore, necessary for the alimentary substanee to pass around all the turns of the valve. In the Syphurus there is interpolated between the reticulated membrane and the muscular coat a thick layer of a glandular substance, which is close in its texture, a greyish colour, and in which may be seen some small white branches. The last portion of the intinule canal has neither valve, reticulation, nor glandular substanee; its coats are thin, and its diameter diminished.

Cuvier describes the intinule canal of the Syphurus as being short, but contrived to retard the passage of the alimentary substances through it. It is very wide for two-thirds of its length, and is then suddenly contracted into a small canal; it next becomes dilated a second time, and forms an oval pouch, the cavity of which is divided by a circular valve: the successive enlargements and contractions produced by these are visible on the external part of the intinule: the pouch opens into a short and contracted canal, which is analogous to the rectum. The first portion of the intinule of this fish is much muscular, and exhibits a network on the internal surface, similar to that of the Syphurus; the meshes of which are, however, not strongly marked, except in the first two thirds of the intinule. The papillae of the pouch, containing the valves, are thin, but the short canal, immediately succeeding, has an evident muscular coat, and the internal surface longitudinally pleated.

In theunday pelagus the alenntary canal is without convolutions, as already mentioned, and prefers nearly the same diameter throughout its whole length; the first or small intinule has thin and transparent coats, and the inner surface is covered with longitudinal plicae, waving and matted together; it is separated from the second intinule, or rectum, by a circular valve; the latter canal has strong papillae, and upon the internal surface thick rugae running longitudinally, ferrated upon their edge, undulating, and sending branches to each other. The Syphurus acus differs from the Syphurus in wanting the rugae in the second intinule, which is smooth and covered with fine cuticle.

The operculum cubicus, in which the intinule is without convolution, has the first portion slightly pleated internally, and in the second more eminent rugae disposed longitudinally and parallel to each other. This part of the intinule is likewise more muscular, and separated from the first by a circular valve.

In the Balistes the first intinule is, for about two thirds of its length, thin, uniform in form and smooth internally; at the commencement of the last third it exhibits some dilatations, and towards the end becomes much enlarged, at which place the internal coat acquires a beautiful yellow appearance; a contraction of the papillae, and an annular projection internally, serve to distinguish the commencement of the second intinule, which is short and longitudinally pleated on the surface.

In the genus tetradon the intinules make two or three convolutions, but prefer near the same diameter throughout; a fold of the inner membrane is placed at the beginning of the second intinule, which has stronger coats than the intin.
The intestinal canal is longer in the *moor-fish* (tetraodon mola) than in the other species, and forms numerous convolutions. The first intestine is capacious, and has a strong muscular coat, which exhibits on the internal part of the gut very distinct longitudinal fæces; the intestine diminishes in width near the pylorus, and the thickness of its coats at it proceeds. There is also a thick white glandular layer between the internal and muscular coats, which disappears on approaching the second intestine; in which, however, it is again formed. The intestinal surface of both intestines is covered with villous processes, that are at first coarse, but become fine towards the commencement of the second intestine, in which they re-appear.

The intestinal canal of the *sea devil* (lophius piscatorius) has but little variation in its capacity from one end to the other; the folds of the internal membrane take a lozenge figure.

In the lump fish (elyotecpus lumpus) the first intestine is distinguished from the second by a circular valve, which projects into the latter; the muscular coat of the fish is also less thick and has the fibres circular, while in the second they are considerable, and are arranged upon the external part of the intestine longitudinally; both intestines are plicated on the inner surface, but the second has the folds larger and less regular.

In the anarrhichas lupus the second portion of the intestinal canal has thick coats, and an external layer of longitudinal muscular fibres; the two parts are indicated by the interposition of a circular valve, but the internal surface of both is covered by a number of fringed plicae arranged in different directions.

The several parts of the intestinal canal in general have little variation with respect to their capacity. In the genus *murena*, the conger (murena conger) has the second intestine wider than the first; it has also, particularly at the commencement of the canal, a glandular structure of the internal coat, similar to that already described in the *flureon*. In all this genus the distinction of the two portions of the intestines are marked by a similar valve.

In the uranostomus fischeri the first and second intestines are not distinguished by any valvular projection of the internal surface, but by the structure of their coats. They are at first thick and the canal small, soon afterwards the intestines become much enlarged, thin, and transparent, which structure is continued near the anus; the internal membrane produces in the first division of the canal a longitudinal plica, touching each other in a zig-zag manner; these gradually decline, and in the part corresponding to the rectum become strictly longitudinal and parallel, with small rugæ arising alternately on the fide. The canal experiences many convolutions.

The first intestine of the *sewer* (trachinus draco) is reticulated upon the inner surface; the second portion is thin.

In the genus *gadus* the first and second parts of the intestinal canal are distinguished both by a difference of structure and a valvular projection; the first intestine of the bate (gadus merluccius) has upon the inner surface fringed plicae, which gradually diminish towards the rectum. In the cod (gadus morhua) the canal is smooth internally, except at its first convolution. In the ling (gadus melus) the first intestine is plicated longitudinally; and in the whiting (gadus merlangus) the intestinal canal appears smooth on the inner surface; the rectum is very short, and wider than the first intestine.

In the *remora* (echeneis remora) the first intestine is rugous, the second smooth.

In the genus *cottus* there is a valve at the origin of the second intestine. In the *cottus niloticus* there is a glandular substance situated behind the internal membrane, reaching for some way from the pylorus, that increases the bulk of that part of the gut, the diameter of which is also very wide; the canal, after proceeding for a considerable distance, becomes again dilated at the small portion corresponding to the rectum. The whole extent of the small intestine exhibits internally a net-work, which has very deep meshes; in the rectum the same structure is observed, but the meshes are wide and shallower.

The intestinal canal forms three convolutions in the *serranus borrida*. The intestinal canal is slightly plicated and villous, and the plicae are thin in the first intestine; the rectum is somewhat larger, and has internally waving longitudinal folds.

In the *dory* (zeus faber) the two intestines are divided by a conical valve. The first is reticulated upon its inner surface; when viewed with a magnifying glass, we have observed each mesh to include a finer network within it, and the projections of the membrane, which form the reticulation, to end in delicate villous laminae; probably the same structure would be found to exist in the intestines of many other fishes, the rectum in the *dory* is without reticulation, and thin in its parietes.

There is some variety with respect to the structure of the intestines in the flat fishes (pleuronectes). The plaice (pleuronectes platessa) has the canal wide for some way from the pylorus, after which it gradually diminishes to a moderate size, and continues of the same magnitude to the anus; the inner surface is covered with well marked plicae arranged longitudinally, and others connecting them transversely; in the wide part of the intestine the plicae are so prominent that they float in the cavity, the border is plated like the ruffle of a skirt, and altogether they produce one of the most beautiful surfaces we have observed in the intestines of fishes. This plicated structure becomes gradually less evident in the course of the canal, and is nearly lost on approaching the rectum. That portion of the intestine plicces also reticulated plicae, but they are indistinct; the intestine becomes thick and fleshy near the anus. Cuvier affirms, that its diameter is twice as great as that of the preceding part of the canal; but in those instances we have examined, if any difference could be observed, the rectum was less than the adjoining part of the intestines. There is a circular valve at the commencement of the rectum.

In the turbot (pleuronectes maximus) the internal membrane of the first intestine produces fringed laminae, which are close together and reticulated; they gradually decline, and in the rectum, the origin of which is marked by a valve and a sudden dilatation, the laminae or plicae become very remarkable, floating in the cavity of the intestine. The canal is most muscular, from the first convolution to the pylorus, and in the rectum.

The first intestine of the brill (pleuronectes rhombus) is plicated internally, it is at first large and then becomes contracted. The rectum is smooth and considerably wider than the part of the canal immediately adjoining it.

In the sole (pleuronectes folies) the diameter of the intestinal canal is nearly the same throughout, although Cuvier affirms the contrary. The internal surface of the first portion looks as if it were grooved, the folds projecting very little, and being closely applied to each other; they pass in a waving manner.
manner in the longitudinal direction; near the pylorus, however, the folds are more prominent and puckered or plated upon the edges. The pits of the rectum are thin; the internal membrane forms in it a flight, imperfect, longitudinal folds. The two parts are distinguished by an annular projection.

In the Pleuronectes limanda, Cuvier states the intestine to be very wide at the commencement, and after diminishing to be enlarged again a little in the rectum. The internal membrane has flight rugos arranged in a lozenge figure near the pylorus, but farther on it becomes smooth.

In many of the genus chit budon the intestinal canal is very large; in the chit budon aceratus and chit budon zebrus the plicae of the intestine are thin, delicate, and transparent, and dilated in some places for containing the excreta. The internal membrane of the first intestine has the plicae disposed in a zig-zag manner near the anus, their coats become thickened and rugose internally.

In the genera labrus and parus the structure of the intestine varies in the different species; in the labrus niphon the rectum is fo wide, according to Cuvier, as to resemble a sac, into which the first intestine is inserted; a valve is situated at this place. In other species the sudden enlargement of the rectum also exists, but the valve is wanting in the gilbus sarafis (labrus tinca); the first intestine is of the same diameter as the stomach, with which it appears to be continuous, it is villous and reticulated on the inner surface; the rectum is very short and twice the width of the first intestine; its internal membrane exhibits a cellular appearance from the meshes of the net-work being deep.

The coats of the intestines in the sparus spinifer are thin, and the internal surface is without villi or plicae.

In the perch the first intestine is a little enlarged at the commencement, afterwards it diminishes, and again acquires bulk; the second portion or the rectum exceeds it in size every part of the canal. The internal coat of the first intestine furnishes numerous laminae, forming many-tined areola, which gradually become longitudinal and parallel to each other. There is a prominent funnel-shaped valve at the origin of the second intestine; as usual, this part of the gut has longitudinal fibres in its mucular coat. In this fish the structure of the rectum is singular, its longitudinal folds are denticulated upon the edge, and are crossed by other transverse plicae in a zig-zag manner; the folds which compose the angles that are directed towards the anus are more prominent than the rect and concave, so as to produce little cups or faces. The boga (perca labrax) has loo, plated, longitudinal laminae on the internal surface of the first intestine, exactly resembling those of the small intestine of the swine; the second intestine has remarkable thick coats, and is perfectly smooth on the inner surface.

In the stickleback (gasterosteus aculeatus) the intestine is very wide at its origin, it soon, however, becomes small, and continues so to the end of the canal.

In the mackerel (scomber faunurus) the internal membrane of the first intestine is nearly smooth, but that of the second is plicated.

Cuvier describes a very remarkable caecal process, or cul-de-sac, which is situated at the origin of the rectum in the piper (trijola fora), it palis for a short distance on the side of the first intestine, from which it is separated by a semilunar valve; it resembles, in form and position, a good deal the cæcum in mammals, of which no other fish affords a similar example.

In the tenia laevis the inner surface of the intestine is slightly villous; the two portions are not distinguished by a valve as usual, but near the anus the canal becomes greatly enlarged, and again diminished before its termination.

The intestinal canal in the genus cyprinus forms no dilatation or internal valvular projection, but usually diminishes in its course from the oesophagus to the anus, both in diameter and the strength of its coats.

In the carp (cyprinus carpio) the intestines make three convolutions and one-half; the internal membrane at the beginning of the first portion of the canal produces a reticulation, of which the intervals are very deep, refembling the cellular appearance of the intestine described in the flounder. This network gradually diminishes in the carp, until near the anus, where it again increases.

In the barbel (cyprinus barbus) the internal membrane furnishes a thick, with villous appearances; and are finely villous; towards the end of the canal the villi are less thick, and the plicae more compact and smaller, to give the appearance of a grooved surface.

In the sard (cyprinus ruthus) the inner coat furnishes beautiful plicae paling in zig-zag transversely; they are larger and closer at the commencement of the canal than in the succeeding parts; near the anus the edges of the folds have a fringed appearance.

The inner surface of the intestine in the cyprinus dolus is villous in every part, but there are no zig-zag plicae.

In the tench (cyprinus tinca) there are irregular zig-zag laminae, with fringed edges.

In the genus clupea the diameter of the intestinal canal is nearly the same throughout; the coats are thin and weak, the intestine is also usually short, they do not form any convolution in the herring (clupea harengus), and only two turnings in the anchovy (clupea harengus).

In the mullet (mugil cephalus) the intestinal canal is singularly long, and forms convolutions one around the other, but in the manner of the intestines of several birds, they are much more numerous than they are represented by Collin in his anatomy; we have counted eleven turns of the intestine, which were all visible on first opening the body; the convolutions are pressed together, and the interfaces filled with fat, so that the whole forms one mass which almost occupies the whole abdomen of this fish. The diameter of the canal varies but little throughout its whole extent; the internal membrane is without folds, but furnished with villous processes, which are thick, long, and distinct in the first convolutions, but as usual gradually decline afterwards.

In the gars fish (eox bisse) the intestine extends from the mouth to the anus without any convolution; it should be remarked, however, that the abdominal cavity is very long in this fish. Cuvier states the structure of the intestine to be the same throughout its whole length, and that the inner surface of it is smooth, and without villi; but we find in our notes that the internal membrane is villous, and, if minutely examined, is likewise reticulated; and that the villous structure is extended in two flaps upon the inner surface of the second intestine, and thus disappears.

The plicae of the intestinal tubes in the common pilch (eox lacus) are thick, and the origin of the rectum is marked by a valve, and also by an increase of volume; the internal surface of the first intestine is villous, and appears grooved; in the second the villi are very long and fringed.

In the salmon (salmo farus) the internal membrane forms in the beginning of the intestinal portion very long villi, which float into the cavity; these gradually diminish, and in the last part of the gut there are broad transversal folds, which become larger and more distinct as they approach the anus. The


**FISH.**

The intestine of the trout (*salmo fario*) wants the villi, but the transverse pile are more regularly placed than in the salmon.

Cuvier describes the intestinal canal of the *ichthys* (*polypterus* *nit-tabs*, Geoff.) as being similar to that of the *anguilla*. There is a spiral valve that commences immediately beyond the pylorus, and forms right turns, which are approximated and prolonged posteriorly; this valve does not extend to the anus, and the interval which wants it, Cuvier considers as the rectum; between the internal and muscular coats there is, at the commencement of the canal, a glandular layer, which increases the parietes, for the dilatation of a diametral to double their force, after which it is scarcely to be perceived in this part of the intestine. The internal coat forms a network, as in the *anguilla*, of which the mother becomes smaller, as they recede from the pylorus, and are almost entirely elided beyond the gland. The parietes of the rectum are very thin, and its inner coat shows some digit longitudinal folds.

In the *anabas* *tetrapthalmus* the internal membrane of the first intestine produces a fine and apparently glandular reticulation, and the parietes of the second intestine are very thick, and the inner surface pleated longitudinally.

Cuvier describes a curious structure in the intestine of the *anguilla* *lagre*; the beginning of the canal is wide, it then contracts and continues for some way of the same size; about the middle, the intestine is suddenly enlarged, and its coats become thin, and there is a kind of division of the first half of the canal, which opens into the second by a small orifice, bordered by a circular valve; at some distance beyond this place the parietes acquire thickness, and the diameter of the tube becomes small as before; and finally, this intestine terminates in the rectum, which is large and dilated at this place. The valve of the rectum is very prominent, its parietes are remarkably strong and muscular, the inner membrane has longitudinal folds; a similar appearance exists on the inner surface towards the end of the first intestine, but they are ramified nearer the pylorus.

The intestinal tube in the genus *mormyrus* has an uniform diameter, is smooth internally, and supplied with a valve at the commencement of the rectum.

From the preceding description it will be perceived that the intestines of fishes possess a more complicated and beautiful structure of the internal membrane than exists in any other class of animals; the alimentary canal of fishes, for this reason, as well as the nature of their food, is generally found to be short; the last division of it, which in mammals very properly receives the name of the *great or large intestines*, is, as before observed, often the shortest and most controlled part of the canal in fishes. The rectum in this class rarely serves as a re-servoir for faeces; its internal surface is often as well fitted for forming and abrading the cæsa as the first portion of the gut, and sometimes even more so; it may, therefore, be said of fishes that the whole tract of their alimentary canal performs, in a greater or less degree, the functions of the small intestines in other animals.

In Plate II. of the *Anatomy of Fishes*, fig. 9, shows the valvular portion of the intestine of the *sole* (*raja batis*) which is dried in order to render the turns of the valve more distinct. Fig. 10, exhibits a piece of the valvular part of the intestine of the *anguilla* (*angia faria*); *a*, the central portion; *b*, the coiled part; *c*, the internal surface of the parietes of the canal. Fig. 10, of Plate III. of the *Anatomy of Fishes*, gives a view of the internal surface of the first intestine of the *anguilla*, where the cæsa are connected with it; *a*, the surface of the gut deeply reticulated or cellular.

Fig. 11 of Plate II., a portion of the first intestine of the dory (*anguila faher*) on which the meso- and intermediate reticulation of the internal membrane are represented. In fig. 12, of the same plate, the internal surface of the intestine next the pylorus is displayed in the *burdock* (*ploroneeta maximus*); *a*, the laminated appearances of the internal membrane of the intestine in this fish. Fig. 13, exhibits a portion of the first intestine in the *platte* (*ploroneeta platffu*) laid open to expose the pukeled pit of the internal membrane. Fig. 14, of the same plate represents the abdominal visera of the *mullet* (*angia sebulae*) as they appear on opening the body; *a*, the oesophagus; *b*, the liver, containing the thomach; *c*, the numerous coils formed by the intestinal cavity in this fish; *d*, some of the pyloric cæsa, nearly of the same size of the intestine. Fig. 15, is a piece of the intestine of the *mullet* laid open, by which the villi of the intestinal surface are seen.

In Plate III. of the *Anatomy of Fishes*, fig. 1, exhibits a part of the intestinal canal, with the gland attached to the rectum in the dog-fish (*shpalus catadus*); *a*, the rectum; *b*, the glandular body, of an elongated figure in this species; *c*, a portion of the valvular part of the intestine left. Fig. 2, shews this gland in the *sole* (*raja batis*) magnified and laid open; *a*, the fundus; *b*, the neck of the gland; several irregular depressions are seen upon the inner surface. Fig. 3, represents the valve-formed termination of the valvular intestine of the *shpalus maximus* in the rectum, described by Mr. Home. Fig. 4, exhibits the inner surface of the rectum in the *burdock* (*ploroneeta maximus*); *a*, a portion of the first intestine, with slight, waving, longitudinal folds; *b*, the commencement of the rectum, marked by a valve; *c*, the internal surface of the rectum, forming very prominent, floating laminae; *d*, the anus. Fig. 5, shews the form of the rectum, and its connection with the first intestine, in the *pinellodus lagre*; *a*, the orifice of the rectum, which is enlarged, and receives the first intestine in the way of inflation; *b*, the rectum becoming again enlarged. Fig. 6, exhibits the cæcal process in the *pira* (*trigla lyra*); *a*, the first intestine; *b*, the part analogous to a cæcum; *c*, the rectum.

**Liver.**

The situation of this viscus is generally the same in fishes as in the preceding classes; *i.e.* it immediately precedes the stomach, which it covers more or less by its lobes. In the genus *ploroneeta*, however, and some other fishes which have the abdominal cavity short and round, the liver lies between the side of the stomach and first convolution of the intestine; to the former of which it is more immediately connected.

The liver is retained in its position by means of reflections of its peritoneal covering, which are attached to the septum that sustains the pericardium, and to the oesophagus, and likewise by the large veins that come from the liver to the junction of the subcelian veins.

The magnitude of the liver is in general very considerable in proportion to the size of the fish.

The colour of the liver varies; it is generally paler than in other animals; often an ash colour, and sometimes milk-white.

Its form is subject to continual variety; it is generally not divided into many lobes; most frequently, perhaps, only into two. As Cuvier has considered the divisions of the liver more in detail than we have done, we shall chiefly follow his description, given in the "Leçons d'Anatomie comparée."

In the genus *lamprey* (*petromyzon*) there is but a single lobe
The liver is much elongated, and has a good deal the figure of a tongue.

In the rays the liver is divided into three long lobes, which extend throughout the whole length of the abdominal cavity. Cuvier describes but two long and very distinct lobes in the genus *fuguhus*, but, besides these, we have noticed in the lobe *fuguhus caudatus* two very small, thin lobes, united upon the side of the stomach next the spine.

The *fuguhus* and *fuguhus* have two large lobes to the liver, which are subdivided in the latter into a great number of lobules.

There are three divisions made by shallow furrows in the *fuguhus* (*fuguhus pescatorius*), and one lobe only in the *fuguhus* pelagicus, the *tetraodon*, and the *lumpus* (*cyclopterus lumpsus*).

Amongst the apodal order of fishes, the *eel* (*murens*), and the *ammodictyes tubulans*, the liver is not divided, but merely a little notched in some species of the *eel*; but there are two lobes in the liver of the *anarrhichas lupus*, the *electrical eel* (*gymanostoma electri*), and the *frunatum paru*.

Of the *fuguhus*, the genus *gadus* and *blennius* have two or three long lobes.

In the *bipinatilus* (genus *merlangus*) the left lobe extends almost the whole length of the abdominal cavity, between the intenines and air bag.

The *thunnus* (*trachinus draco*) has the liver composed of one lobe.

The liver is triangular, and without division in the *cotus niloticus*, but the *cotus scorpius* has two lobes. There are also two lobes in the liver of the *scorpius scorpius*, although that of the *scorpius horridus* consists of a single lobe. There are two lobes in the liver of the *trigla cirripus*, of the *mullus barbatus*, of the *echeneis remora*, of the *pleuronectes flodus*, and of the *tetraodon* (*pleuronectes maximus*). The liver is without division in the following species of *pleuronectes*; the *plaice*, the *pleuronectes platessa*, and *limanda limanda*; there is a small lobe placed behind the principal one in the *sole*, of a singular shape, with two points like horns, which has not been noticed by Cuvier.

The liver has three lobes in the *fuguhus thunnus*; that of the head (from *fuguhus*), and of the pilot (from *fuguhus*), have two lobes. There are three lobes in the little *shad* (*aletus*), the common *shad* (*aletus*), and four in the *gasterosteus fuguhus*.

The divisions of the liver are equally various in the *piscis* and *fuguhus*; the liver is without lobes, and of the shape of an arrow; in the *rupe* it is likewise undivided, and triangular in the *fuguhus*; although Bloch says, there are two unequal lobes in the liver of this fish. In many other *fuguhus* and *piscis* the same phenomena occur. There are three lobes, deeply separated. In the *loper* (*seus fischer*) there are two lobes, one of which is very much larger than the other, and forms a kind of third lobe at its external corner. There are two lobes in the liver of the *chterodii eilii*, and only two large notches in the *chterodii spinosus*. The *holobranchius fuguhus* has three unequal lobes. The liver of the *fuguhus* *fuguhus* has three lobes; there are two in that of the *fuguhus* *fuguhus*, the *fuguhus* *fuguhus*, and likewise in the *fuguhus* *fuguhus*; but it is a single lobe in the other species of *fuguhus*.

In the genus *cyprinus* the liver is very deeply divided into lobes, of which the number varies according to the species; in the *carp* (*cyprinus carpio*) the lobes are so disposed amongst the different convolutions of the intenines, that it is difficult to ascertain their number; the liver in this species exceeds in proportional bulk that of every other animal. The liver does not divide into lobes in the *pike* (*esoc lucius*), in the *esocus esculentus*, in the *fuguhus* *fuguhus*.

In the *fuguhus* *fuguhus* and *fuguhus* *fuguhus*, in the *callias* tetraophthalmus, and in the *elatius* *auloides*. There are two lobes in many of the genus *riparius*, in the *florus glaucus*, and in the *tetraophthalmus maximus*. There are three lobes in the liver of the *florus lagus*.

It should be observed, that in the above instances there are usually several light notches and furrows upon the surface of the liver, which, I think, would, perhaps, consider as divisions of this viscus, although Cuvier has not done so.

The divisions of the liver, as well as its figure, are but of little importance in all animals; sometimes they are designed to accommodate the neighbouring viscera, and at others look like accident; but in no case can the form materially affect the functions of this organ.

The texture of the liver in fishes is remarkably soft; unless in a very recent state, it immediately gives way under the pressure of the fingers. From all the observations we have been able to make, however, it appears to possess the same structure as the liver in the three preceding classes; the ventricle terminates in pinnellous branches, even more evidently in many fishes than in birds or reptiles.

The liver contains a great quantity of liquid oil in those fishes that have not the fat dispersed over the different parts of the body; of those the *florus lagus* and *pygmy*. The *florus lagus* has the liver so rich with oil, that the inhabitants of Norway catch it for the purpose of obtaining its oil to burn. Mr. Hope states, that the liver of the *florus lagus* maximum yielded about three bogsheads of oil. The oil of fishes appears as if it were diffused in those parts which contain it, as it readily flows from them, but it is more probably deposited in large cells, which freely communicate, than in the common interstitial fibres.

The *bilary duct* of the liver in fishes, except in very few instances, do not communicate to form a common hepatic duct, as in other animals; they proceed directly as they leave the different lobes of the liver, to open either into the gall-bag or its excretory canal, or into both; in consequence of which the hepatic ducts are in general numerous and very small in fish.

In the *fuguhus* *fuguhus* a fasciculus of twelve ducts, like a navel string, proceeds from the liver to the intestine, from which it is preferred there is no gall-bag in this species.

In the *ray* genus there are several very slender ducts, which terminate in the gall-bag, and one large branch, which is furnished by the middle lobe of the liver, and communicates with the cystic duct.

In the *florus lagus* the different hepatic ducts produce a trunk, which, however, does not go on to the intestine, but terminates in the cystic duct.

In the genus *tetraophthalmus* there are three principal hepatic ducts, of which the first opens into the gall-bag, near the neck, and the other two enter the cystic duct at different distances.

In the *fuguhus* *fuguhus* there are two hepatic ducts, which end in the cystic; the one at its origin, and the other at some distance.

The *lumpus* (*cyclopterus lumpsus*) forms an exception to the general rule, with respect to the termination of the hepatic ducts; in this fish there is no gall-bladder, and the different branches from the liver form unite, to form a single duct, which proceeds directly to end in the intestine. The few fishes which do not possess a gall-bag have probably a similar structure, although it has not been examined.

In the *anarrhichas lupus* the hepatic ducts are extremely numerous; the right lobe of the liver furnishes three branches, of five or six branches, which enter distinctly into the gall-bag; the left lobe gives origin to three fasciculi; the fishe
has three branches which open into the neck of the gall-bag; the others are composed each of two branches, and end in the cystic duct.

There are three or four principal hepatic ducts in the elk, which terminate in the ductus cysticus near its origin.

In the cod (Gadus morhua) there are several small hepatic ducts, which form four branches; these, after passing some way, enter an enlargement of the cystic duct, which takes place near its entrance into the intestine. In the bale (Gadus morhua) there are many small hepatic ducts, which terminate in succussion upon the cystic duct.

The hepatic ducts of the Scarpaza borrida penetrate the cystic duct.

In the sole (Pleuronectes foleus) the ducts from the liver go chiefly to a dilated part of the ductus cysticus. In the brill (Pleuronectes rhombus) the cystic duct receives two from the liver before its dilatation; and one trunk, which is composed of several branches, enters the dilated part of the cystic duct. In the turbot (Pleuronectes maximus) some of the hepatic lobes open into the gall-bladder, and others into the dilated part of the cystic duct.

In the dog (Solea solea) there are two or three minute canals which pass from the small lobe of the liver into the neck of the gall-bladder, and four considerable ducts that go from the large lobe to the cystic duct, which they enter at different distances.

In the river perch (Percia fluviatilis) the hepatic duct opens into the neck of the gall-bag, and in the sea perch (Sciaena labrax) there are three principal branches from the liver which end in the cystic duct, at different distances.

The barbel (Cyprinus barbatus) has the hepatic ducts ending in the cystic.

The salmon sends hepatic ducts into the neck of the gall-bladder.

In the bichir (Polypterus niloticus) the trunk of the hepatic ducts is joined to the cystic.

In the Galsus bagre there are eight or ten little ducts from the liver to the cystic duct.

In all the inaptites we have examined, the entrance of the hepatic ducts into the cystic, or the gall bag, is not accompanied by any valve or projection of the coats; the structure of the hepatic ducts also appears to be simple, and the internal surface with not any valve or reticulation.

The gall-bag is not universally met with in fishes; it has not been found in the lamprey (Petromyzon marinus); in the pride (Pteromyzon branchialis) in the lump (Cyclopterus lumpus); the piper (Irisys lyra); the Pleuronectes radiatus, the perch of the Nile, and in many fishes; we have not observed a gall-bag in the counver (Trachinus draco).

These instances of the absence of the gall-bladder are fewer than those noticed in mammals, and in birds; a resolution in which the bile may be concentrated, it may be concluded, is therefore more necessary to fishes than to the hot blooded animals; the circumference of the bile all passing through either the gall-bag or its duct, when those parts exist, is a strong proof of this opinion.

Cuvier describes the gall-bag as being more variable with respect to position in fishes than in the other classes; it is situated horizontally or obliquely, in regard to the whole fish, and in those two cases its fundus may be either turned forwards or backwards; at other times it is placed transversely under the stomach, of which the Galsus bagre affords an example; it is sometimes in a degree imbedded or concealed by the substance of the liver.

The form of the bag is also subject to variety; it is most commonly either egg shaped or pyriform; sometimes it is globular; sometimes it is oval, with the end next the duct very obtuse or flattened; this we have observed in some of the flat fishes (Pleuronectes). In the Blott dog fish (Galeus catulus) we have found it of the shape of a tube, nearly two inches long; the duct arises from the end the farthest from the intestine, and is seen like a smaller canal, accompanying the other which composed the gall-bladder.

The bulk of the gall-bag is also variable; perhaps it might be stated that it is large in proportion to the rapidity of the digestion in the fish. The bag is large in the anarthritus lupus, the pike, the loutariu, and monfufa; (Cochinus moris) it is small in the Gyntus placitus, Scarpaza borrida, the river perch; several of the genus choto, the sole, brill, and some others of the Pleuronectes, also have a small gall bag, but in those the dilatation of the cystic duct makes amends for it.

The structure of the gall-bag would seem to be simply membranous, the parietes are thin and smooth on the inner surface, which do not exhibit any glandular appearance or reticulation.

The cystic duct in general passes off directly from one end of the gall-bag, without forming any contortion, as in mammals; it is also, as far as we have observed, a simple membranous tube, with a smooth surface internally, and the orifice by which it communicates with the gall-bag is unprovided with any valvular structure, by which means the bile flows through it without interruption.

The cystic duct transmits all the bile which passes to the intestine, with a few exceptions of those fishes which are unprovided with a gall-bladder; it therefore corresponds to the duodenum communicating with the intestine. In several fishes, as the cod (Gadus morhua), some of the Pleuronectes, as the sole, brill, turbot, and others, the cystic canal forms a remarkable dilatation previous to its termination in the intestine; this dilated part receives some or all the ducts from the liver; it is so large in the turbot, that Cuvier describes it as a second gall-bag, to which it certainly corresponds in its office, by accumulating and detaining the bile on its way to the intestine.

The cystic, or rather common biliary duct, usually discharges its fluid into the intestine, along with the pyloric ceca, by an opening in the midst of theirs; sometimes it ends in one of the ceca. This happens in the plaice (Pleuronectes platessa), the river perch, and the dog (Solea solea). The duct enters the intestine at some distance from the pylorus in the pike (Esox lucius).

In the Galsus maximus, the orifice through which the bile is poured into the intestine is placed upon a process like a nipple.

The magnitude of the liver, and the formation of the biliary ducts in fishes, plainly indicate two circumstances in their physiology, namely, that a large quantity of bile is secreted, and that this fluid passes in a concentrated state into the intestinal canal. It is remarkable that the bile is more slowly to be detected in the tract of the first intestine, and that even the faces in the left portion of the canal are less coloured by this secretion than in other animals; this factstrongly supports the opinion of the bile being deflected to assist in the conversion of the alimentary substance into chyle, in performing which it is itself decomposed and dispensed of.

The bile of fishes, as far as we are acquainted, has not yet been submitted to any exact analysis; it does not however appear to differ materially in its properties from the same fluid in other animals. It is usually of a deep green colour, although the liver is often in fishes of a pale yellow colour, which probably arises from the bile being for some time in the gall bag, before it is carried into the intestine. It is also more fluid than in mammals and birds, as might be
be expected in consequence of the gall-bag not being con-
structed to furnish a mucous secretion as in their animals.

In figs. 5 and 6, of Plate I. of the Anatomy of Fishes,
the letter f indicates the fasciculus of twelve biliary ducts,
which are found to pass from the liver to the first intenelles
in the fuguatus maximus.

In Plate III. of the Anatomy of Fishes, fig. 7, shows the
manner in which the hepatic ducts proceed to the gall-bag
and cystic ducts, a, the portion of the liver next the gall-
bag, b, the gall-bag, c, the dilated part of the cystic duct;
d, the hepatic ducts passing to the gall-bag; e, the
ducts from the liver to the dilatation of the cystic duct.
Fig. 8. of the same plate, exhibits the termination of
the biliary ducts in the volf fis (anarrhichus lupus). a is
the liver; b, the gall-bag; c, the cystic duct; d, a portion
of the intenelle, into which the cystic duct opens; e, fasciculus
of several hepatic ducts from the right lobe, going to terminate
diffinitely in the gall bag; f, fasciculus from the left lobe,
ending in the neck of the gall-bag; g, h, two other fasciculi
from the left lobe, which open into the cystic duct.
Fig. 9. of this plate, represents the hepatic ducts going to
the intenelle in the lump fis (cyzoloptrus lupus); a is
a part of the liver; b, the hepatic duct, coming from the
liver, and uniting into a common duct, which is indicated
by c; d is the portion of the intenelle into which the
common bile emerges.

In fig. 6. of Plate I. of the Anatomy of Fishes, the letter
f points out the nipple-shaped process, on which is seen the
office of the hepatic ducts within the intenelle of the fuguatus
maximus.

Ceca, or pyloric Appendices.

Cuvier has, with some propriety, considered these parts as
proceles of the intenelle canal, and has combined his de-
scription of them with that of the intenelles; in some fishes
they are so wide, that the alimentary tubercules may neces-
sarily pass through them, but in general they are very small
worm-like processes, with a cavity scarcely wide enough to
admit a probe; but whatever their bulk may be, they are
always continuous with the tube of the intenelle.

The internal surface of the ceca is extremely vascular,
even more so frequently than that of the adjoining intenelles.
When the internal membrane of the intenelle is plicated or
laminated, that of the ceca is sometimes reticulated; but in
general the structure of the internal surface of the ceca cor-
responds with that of the neighbouring surface of the intenelle,
although it may not be so fibrillating.

The cavity of the ceca always contains a quantity of
renaceous mucus, which may be more abundantly obtained
by pressing the parietes of the ceca between the fingers.
The ceca possess a muscular and membranous coat, like
the other parts of the intenelle canal.

The ceca in general bear considerable resemblance, both
in size and figure, to a cluster of worms attached to the
canal of the intenelle by one extremity; in some instances
they are confined to form trunks, which open into the
intenelle. In the spadasaria they are united two and two,
and produce seven principal branches, which at last join in
one trunk. In the furgas they are shut and wide, and
collected together into one mass, into the centre of which
they all open by very large mouths; the inner surface is
deeply reticulated, so as to give the whole mass, when cut
into, rather the appearance of a congest of cells, than a
collection of ramified tubes, which has led many authors to
describe this part in the furgas as a single gland analogous
to the pancreas; the muscular coat is strong, and has the
fibres distributed in different directions, and the opening of
the conjoint ceca into the intenelle is single, and would
be as wide as that canal if it were not for a narrow fold
which contracts the orifice a little. There is a greyish
glandular sustance very discernible behind the cells, similar
to the glandular layer already noticed in the intenelle of
this fish.

There is great variety with respect to the number of the
pyloric ceca, and in several fishes they are altogether wanting;
neither is their presence, however, nor their number, seems
to have much relation to the habits or general structure of
the fish, except in the ray and shark genera, in which the
ceca are wanting, and their places supplied by a real pancreas.

Besides, in the chondrostei the ceca are not found in
the genera spadus, ofraction, alfites, tetradon, and dodon,
amongst the branchii; in any of the apodal fishes: in
the uraneosus and blennius genera, in some species of
pleurodon etc.; in the ffrus spinifer, and the labrus tinta: in
the anaplus tropthphilus, many species of efox, the genera
cyprius and cfarilus, and probably others which have not
been examined.

Cuvier has taken the pains to reckon the number of the
pyloric ceca which exist in many fishes; we shall therefore
follow his account.

The ljbrus piscearius has but two, which are small
and somewhat pyramidal in their shape.

In the cyzoloptrus lumpus the ceca are small, form about six
ramified rays, and as they approach the intenelle they unite
and open into each other.

In the genus gadus, the number of the appendices varies;
they are often ramified, or united into trunks, which
open into the intenelle; there are four orifices of these in
the bag (gadus merlangus), and six in the cod (gadus
merluccius). In the bate (gadus morhubus) there is, in place
of the ceca, one large cul-de-sac, of which the bottom is turned
forwards, and which opens by a large aperture into the
commonest exit of the intenelle canal: there are eight ceca
in the gadus mehdes, thirty-two in the barbel (gadus
fianus), and thirty-four in the dog (gadus molva).

There are eight long and slender appendices in the swaner
(trachinus draco).

In the genus cottus the number of the ceca varies from
four to nine.

They are far in the remora (elichia remora). Twenty-
three ceca are found in the ferrall (sollus ferrallus), and
fix only in the mulus barbatus.

The florenches bovidae has four ceca: the number varies
much in the genus triceps: the pipe (trigla lyra) has from
eight to ten; the trigla esophrana has six.

In most of the pleurodon etc. there are but two ceca, as
in the turbos, the fish, the pleurodon lusmica, the fomden,
the shad. Cuvier also reckons two in the plaice, and only
one in the bolilus: as far as our recollection serves, there
are two very large ceca in the balilus, and in the plaice,
besides the two small conical dilatations at each side of the
origin of the intenelle canal. We have lately discovered,
about an inch beyond this, a third cecum, from the side of
the intenelle, exactly resembling in shape and structure
the two already described by authors. This is the more
worth of remark, as it is the only instance we know in
which the first intenelle of fishes furnishes any such process
except at the pylorus.

In the macrurus (foamder formaderus) the ceca are very
numerous; but there are only three in the foamer fajianus,
in the foamder thynus there are two, which divide each
into three branches. In the pla (foamer daller) there are
twenty-five; and in the sfae (foamer teusnarios) twelve or
thirteen ceca.
There are but two little appendices situated at each side of the pylorus in the stickleback (Gasterosteus aculeatus). The cæca are fine and small in most of the perches and fishes. In the common perch (Perca fluviatilis), and the Perca anguilla, there are but three. In the Perca baium there are four; six cæca are found in the Perca baium. There are seven or eight in the Sciaena aurota, five in the Sciaena labrax, and six in the Sciaena cirrosa, and much greater number in the other individuals of this genus. There are four cæca in the tench (Tinca tinca). The eelodon arcuatus has about thirty long, slender cæca; the cheilodon niger only five.

In the genus Sparus there are usually from three to five cæca; the Sperus falsa has four; the Sperus auratus, and Sperus fargus, have three; the Sparus pavo, Sperus mans, and Sperus brama, have each four, and there are five in the Sparus annulatus. The cæcal appendages are numerous in the genus Clupea. There are eighteen long, slender cæca in the anchovy (Clupea alosa); twenty-four in the herring (Clupea harengus), which open into the intestine by twelve orifices, ranged in a line; there are as many as eighty in the Clupea alosa.

The genus Salmo exhibits great variety in this respect; there are but six in the Salmo salar, although in the Salmo marron there exist one hundred and fifty; in the common salmon (Salmo salar) there are about seventy, placed in several rows, along the side of the intestine. There are two cæca in the mormyria labiatus, Geoffroy.

The common mullet (Anguilla cephalus) has six cæca; the Mugil alosa but one.

The only point of view in which we can consider the pyloric cæca is, as prolongations, or processes of the alimentary canal, designed to furnish an additional quantity of the intestinal mucus; this office is reconcilable to all the varieties of form and number, and the occasional absence of these parts, which could only affect the mucous secretion of the cæca with respect to quantity, and any deficiency of that fluid might be supplied by a more copious secretion from the intestine itself. This opinion seems supported by the relative magnitude of the cæca, and of the parts of the alimentary canal from which they arise. We have observed that the capacity of the stomach, or of the first part of the intestine, is greatest in proportion to the bulk of the fish, in those species where the cæca are either wanting or few, and that these parts are commonly small when the cæca are numerous or large.

In Plate II. of the Anatomy of Fishes, fig. 4, exhibits the three cæca in the plateae (Phlebourites platei): c is the pylorus; d, d, the two pyloric cæca, e, the third cæcum peculiar to this fish, arising from the intestine, a short distance from the pylorus. Fig. 12 of the same plate gives a view of the internal surface of the cæca, and the adjoining parts of the intestine in the turbot (Phlebourites maximus): a is the laminated surface of the intestine; b, b, the internal membrane of the two cæca, in which the laminated structure is less apparent. The letters c, d, e, of fig. 7, and the letter d, in fig. 14, of this plate, refer to some of the cæca in the mullet (Mugil cephalus).

In Plate III. of the Anatomy of Fishes, fig. 10, shews the internal structure of the cæca, and their connection with the intestine in the Sperus (Sperus fluviatilis): a, the cavity of the intestine; b, the cavity of the pylorus; c, the cavities of the cæca exposed by a section. The larger orifices belong to branches of the cæca; the smaller to the cells produced by the reticulation of their internal membrane; d, the large common opening of the cæca into the gut; e, the muscular coat which surrounds the cæca, and gives them the appearance of a single gland. Fig. 11 of the same plate represents the numerous cæca in the Sperus (Sperus fluviatilis); a is a portion of the intestine at the pylorus; b, b, the cæca in great numbers arranged along the intestine.

**Pancreses.**

This gland only exists in two genera of fishes, the ray and flœck; the glandular apparatus which has been described by some anatomists as a pancreas, in the flœck, is really, as we have before observed, only an arrangement of short cæca, having many communications with each other. The pancreas is situated immediately beyond the pylorus, upon the first intestine; its form is somewhat triangular, but very irregularly so; it is divided into lobes. In the smaller deg-fœck (Pampus catulus), we have observed the pancreas to be double, or of two portions, of which one is placed on each side of the intestine.

The texture of the gland is felt, compact, and uniform; its minute structure is, therefore, obscure; its colour is a rich reddish white: it has a much smaller proportional volume, than the pyloric cæca usually have, to those fishes in which they exist.

The fluid which this gland secretes, appears to resemble the pancreatic juice of the three preceding classes of animals, and not the mucus of the pyloric cæca; which circumstance, as has been before mentioned, affords a strong presumption that the offices of these two secretions are different.

**Spleen.**

This organ is supposed to exist in all fishes; we have, however, failed to detect it in two families of the Lamprey (petromyzon marinus); but, until assured by further observation, we are unwilling to assert positively, that fo extraordinary a departure from the common structure of the cæca does occur in this species; it may be presumed, however, that if this fish possesses a spleen, it is so insignificant as to readily escape notice.

The situation of the spleen, with respect to the adjacent viscera, is by no means uniform in fishes; it is perhaps most commonly placed on the upper side of the caudal portion of the stomach, that is, to lie, between its fundus and the fomach bladder, which lies along the back.

In the flœck and ray genera it projects from this situation, so that one half of it lies on the left side of the stomach.

In the angelfœck (Pampus fœnalis) Monroe observed two spleens, one of which was attached to the large, the other to the smaller curvature of the stomach. In the fœck (Pampus catulus) the spleen is divided by a dip fœrure, which is what we presume doct. Monroe meant by two spleens; one portion is on the left side of the fundus of the stomach, and the other paffes above it. Mr. Home represents the spleen of the fœnalis maximus as a chain passing round the stomach. Cuvier describes two branches of the spleen in the flœck (Pampus flœck), which are attached to the curvature that the stomach makes in this fish posteriorly. Doctor Monroe reckoned seven spleens in the flœck, but all very small; the largest, he says, did not exceed the size of a dried horse-bean, and the other fix were none of them larger than a dried garden pea.

The spleen is enveloped by the memency, near the commencement of the intestinal canal in the lampfœck (cypheterus lâmpus). It is fixed on the right side of the beginning of the first intestine in the flœck. In the cat it is placed between the stomach and the next portion of the intestinal canal. In the foarpeca it is found interposed between the pyloric extremity of the stomach, and one of the cæca. The remora has it situated between the liver and the stomach;
the like with that described in the other classes of animals. The arteries divide like the branches of a broom, and terminate in very minute ramulescles; the veins originate from cells, which, although not large, are sometimes very visible in consequence of their containing a dark coloured substance: when the texture of a spleen is unrevoluted, which is very easy from the looseness of its texture, the cells, if filled with this substance, appear like small grains of coffee adhering to the extremities of the vessels: this dark appearance of the cells is not general, nor do we believe constant in the same individual; it seems to be rather an accidental condition of the organ; after it has once been perceived, there is no difficulty in recognizing the same sort of granular appearance, of a pale brownish colour, in the spleens of other fishes. What is the substance which gives the granular appearance in the spleen of fishes? Is it the spleenic blood changed in its properties while passing through the cells? More observation is required to answer these questions.


digestive apparatus, and afterwards in the efferent vessels.

In the 

in a great many cells of very irregular shapes, and all communicating the one with another. The principal ab sorbent vessels pass through it.

This cellular receptacle of the chyle may probably perform the same offices of the absorbent glands in other animals.

The lymphatics of the liver, gall-bag, pancreas, and spleen, also accompany the blood-vessels of these parts; they freely communicate with each other, and, uniting with the absorbents of the stomach and intestines, they form a plexus on each side of the stomach, which proceeds along the sides and the back part of the cesophagus to the side of the spine, and near to the large veins analogous to the subclavian; at these parts all the absorbents of the different parts of the body are assembled.

The lymphatics of the kidneys and organs of generation, with those of the tail and posterior parts of the body, proceed along the spine.

The lymph of the head and lateral fins is conveyed into the common referentary, principally by means of a large trunk, which passes on each side of the head, and which receives posterior lateral branches from the adjacent parts.

The different absorbents of each side of the body, after communicating with each other in the subclavian plexus, furnish two short trunks which go to terminate, the one on the right, the other on the left subclavian vein, near the junction of those vessels with the internal jugular veins. These two trunks correspond in their office to the thoracic ducts of other animals, but do not serve as refts-pores, as they have lost capacity than the plexus from which they take their origin.

At the orifices of the trunks into the subclavian veins, there are placed two semilunar valves, to prevent the blood escaping into them. There is no other influence of valves throughout the absorbent sytem of fishes; although the vessels have a flattened, jointed appearance, as if their canal was interrupted by valvular contractions.

In the efferent vessels, of which the col and baddock are taken as examples, the lacteals are of a smaller size than in the 

The origin of the lacteals is from the subclavian veins, near the junction of the subclavian veins with the internal jugular veins. These lacteals communicate with the absorbents of the intestine, and, uniting with the absorbents of the stomach and intestines, form a plexus on each side of the intestines, which proceeds along the sides of the intestines, and near to the large veins analogous to the subclavian; at these parts all the absorbents of the different parts of the body are assembled.

The thoracic duct, after being joined by these vessels,

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vessels, communicates with the net-work near the orbit; where its lymph is mixed with that of the lymphatics from the posterior part of the gills, from the anterior fins, the belly, &c. and then from this net-work a vessel goes into the jugular vein, just below the orbit.

The lymphatics of the left side agree exactly with those of the right. Hewson’s Account of the Lymphatic System in Fish. Phil. Trans. for 1769.

Neither Hudson nor Cuvier (who seems to have copied his description) have represented the common receptacles of the lymph in 

officinal fishes accurately. These parts do not deserve to be called net-works, but, as Dr. Monroe has named them, large cellular receptacles; they are particularly large in the haddock (gadus eglefinus), and cod (gadus morrhbus), and are most easily demonstrated by injecting with a fluid, or inflating any of the large absorbents in the neighbourhood of them. These receptacles are situated immediately behind the gills, and may be displayed by cutting through the integuments at that place; the receptacles have left scanty, but are still too much dilated to merit the name of a plexus of vessels.

The receptacles communicate by large canals, which cross from one to the other, behind or above the heart, and caecum.

In identity of the absorbents of the viscera already described, the lymphatics of the head and muscular parts of the body give origin to four principal trunks, and a plexus which terminate in the large receptacles, or common reservoir of the system.

The flow of these carries the lymph of the under surface of the body and tail; it is a considerable vessel, extending along the median line of fish; from the tail towards the head it becomes a little enlarged under the thorax, and communicates with the large receptacles, by means of some foramina which lead into a canal on each side, between the two ventral fins.

The next two trunks are also superficial; they run along the sides of the fish near the linea lateralis. From each side of these trunks a number of branches go off immediately under the skin, which produce a beautiful perpendicular appearance; these trunks open directly on each side into the common receptacles that are placed behind the gills. Before these vessels, Hewson describes a deep-seated fct. of absorbents, which accompany the ribs.

The fourth trunk is deeply situated and large, it commences near the tail, and lies between the roots of the numerous processes of the vertebrae; as it proceeds towards the head it collects the lymph, from the dorsal fins and adjacent parts of the body; having arrived near the head it sends a branch to each thoracic duct, near the part where they come off from their common trunks.

The lymphatics of the brain and organs of sense, and those from the mouth, jaws, and gills, form a complex anastomosis or plexus near the orbits, and send a vessel into each of the common reservoirs.

In the salmon each of the receptacles terminates in the jugular, by sending a canal into the upper end of the corresponding artery near the canalis jugularis and the internal jugular vein.

The entrances into the venous system are guarded in 

officinal fishes as in the flate, by semilunar valves.

As the absorbent vessels are unprovided with valves, the most usual way of expelling them, is to inject the fluid from one of the principal trunks: the belt for this purpose is the one which runs under the skin of the belly. By this means the most minute branches may be filled and expelled. Dr. Monroe succeeded in injecting from the trunk, the absorbents of the brain, of the membranes of the eye, and the ear in the flate (roja batis), by which he discovered that the lymphatics of the brain form an intricate plexus; he also filled the ultimate branches of the absorbents of the skin. These are most beautifully reticulated, and are particularly large and numerous upon the upper lateral surface of the flate, on which they terminate by foramina capable of being demonstrated. Dr. Monroe says, that not only water, but air, milk, quicksilver, and even oil of turpentine, coloured with the powder of vermis, were discharged upon the surface of the skin, by a vast number of distinct orifices, placed at regular distances from each other; yet the force with which these liquors were injected was very small, and there was no extravasation into the cellular substance any where under the skin, or in the interstices of the muscles. It is remarkable that the effusion of these liquors upon the skin takes place only upon the upper surface of the fish, where the skin is tough and scabrous: it however proves that it does not happen in consequence of extravasation, or rupture of the vessels, for in that case the effusion would be foamy or principally seen on the under surface of the fish on which the skin is much more weak and thin. Monroe concludes that the cutaneous lymphatics, situated on the back of the flate, are designed to absorb a portion of the water for the purposes of furnishing the salt liquor found in such considerable quantity within the cranium of that fish. See M’roo’s Physiology of Fishes, p. 34.

The facility of injecting the absorbents from their trunks enabled Mr. Hewson also to fill a series of very minute vessels, between the internal muscular coats of the intestines; and upon the plice, (or, as he terms them, vili) in these situations the absorbents anastomose and run together, so as to produce a very close and beautiful reticulation. If mercury be injected into this net-work at one part, it spreads over the intestine; and if the intestine be inverted, and the mercury squeezed, it is easily forced into the small vessels on the internal coat.

In one injection Mr. Hewson made of the flate of the cod, the absorbents were seen to pass through the external coats, dividing into smaller and smaller branches, without any appearance of a net-work between the muscular and villous coats, although considerable force was employed in the injection; from which he concludes that the absorbent vessels of the flate do not possess the same arrangement as those of the intestines. See Hewson’s Account of the Lymphatic System in Fishes. Phil. Trans. vol. ix.

In Plate IV. of the Anatomy of Fishes, fig. 1. represents the curvature of the flate of a flate (roja batis) with the cellular receptacle of the chyle in situ and of the natural size; a, the portion of flate; b, the cellular receptacle attached to it. Fig. 2. of the same plate, exhibits the receptacle magnified, and cut open, after having been previously inflated and dried, in order to expose its internal structure; a, indicates the cellular part; b, b, the absorbent vessels passing longitudinally through the receptacle and communicating with its cells; c, 3.0. Plate IV. displays the common receptacle of the chyle and lymph in the haddock, (gadus eglefinus) with some of the lymphatic trunks which enter it; a is the receptacle distended by injections; it appears like a large sac situated immediately behind the gills; in order to expose it the gill-cover is cut away; b the branch; c is the absorbent which runs along the middle line of the belly, and communicates with the receptacle by branches sent in between the abdominal fins; d, the lateral absorbent trunk, which enters the recep-
receptacle directly; \( e \), the lateral subcutaneous duct, obliquely sees, running parallel with the lateral absorbent vessel.

Heart.

Fishes have not, properly speaking, a thoracic cavity, although their heart and gills are very distinctly separated from the abdominal viscera, by means of a septum, which crosses the body immediately before the liver. This diaphragm is not muscular, as far as we have observed, but receives a slender muscle on each side from the scapula. It is usually thick and firm, and is apparently composed of tendinous fibres, intertwined together like the muscular fasciculi of the internal surface of the human auri, and the web thus formed is further strengthened by the peritoneum on one side, and the pericardium on the other.

The heart is situated in the middle line of the body, between the branchiae each side, and farther forward, that is, nearer the head than in other animals; the space between the mouth and the belly being generally very inconsiderable in fishes.

The pericardium is larger, and of a rounder figure than the heart; this is necessary on account of the irregular form of that viscus.

The external reflection of the pericardium is in general a stronger membrane than the peritoneum; it appears to be tendinous in structure, although commonly very thin.

We have not observed any material deviations from the common structure of the pericardium, except in the lamprey (petromyzon marinus), in which we have lately discovered a mossy formation of the part. The pericardium in this fish is composed of firm cartilage, of a rounded figure, and so far imbedded in the anterior portion of the liver, that a great part of it is concealed from view until the substance of the latter be cut off; there are several fronds, or tendinous processes sent off from the internal surface of this cartilaginous vac, which are attached to the surface of the heart, and serve to sustain it in its proper position in the body.

The above structure in the lamprey is a confirmation of an opinion we have held, that the pericardium does not alter its figure with the contraction and dilatation of the different parts of the heart; from which arises the necessity of a greater quantity of aqueous fluid in this cavity, than is found in those containing the other viscera.

The pericardium of the skates (raja batis), as has been mentioned in speaking of the abdominal cavity, was discovered by Count Monroe to produce a funnel-shaped elongation towards the abdomen, which is divided into two branches or canals, terminating by open mouths in the latter cavity; as far as our observation goes, this structure is peculiar to the ray genus.

The heart in fishes is composed of two cavities only, an auricle for receiving the blood from the veins of the body, and a ventricle for propelling it to the branchiae. The dilatation of these parts is very evident, by which the figure of the heart is rendered peculiar, appearing like two bodies connected to each other.

The portion of the auricle, with respect to the ventricle, is subject to vary; it is usually placed anterior to it; it covers, and often passes beyond the ventricle in the genus gadus; the rays smooth bound (sigalus mycterus), and the dogfish (sigalus canicula), \&c.

The auricle is generally much more capacious than the ventricle. Its figure is not easily alligned; it is a sac, of which the lateral parts are dilated, and at the place where it becomes connected to the ventricle it is in a degree constricted, or forms a sort of neck. The parietes of the auricle are generally thin; its muscular fasciculi form no remarkable projections, and are distributed over the internal surface rather in the manner of a meadowwork or irregular ramification. The opening into the ventricle is usually furnished with two semilunar valves.

In the moonfish (tetragonodon molit) there are four valves of a square shape in this situation, and in other influences, as amongst the flarks (sigalus), the aperture into the ventricle is guarded by a single delicate valve, the border of which is attached by many points to the paries of this cavity. The opening of the ventricle into the auricle is situated rather superiorly, that is, somewhat on the side of the auricle next the spine; it is near the neck, or part which is united to the ventricle, consequently the auricle appears, on opening a fish, like an entire bag, depending from the ventricle, the communication with the cavum not being visible in that view of the parts.

The ventricle has, according to Cuvier, most commonly four sides; we should say, the most usual figure is that of a short pyramid with three sides, the base of which corresponds to the fourth. The ventricle is, however, globular in the smooth bound (sigalus mycterus), and triangular in the dogfish (sigalus canicula), and exhibits some other variations of form in different species. The parietes of the ventricle are strong and thin, and furnish many fasciculi on the internal part of the cavity, similar to those observed in the ventricles of other animals.

At the anterior part of the ventricle, and near the aperture into the auricle, there arises a short tube, from which the branchial artery is afterwards continued. Cuvier has called this part the footstalk or bulb of the branchial artery. Its figure is various; in the flurgeon (acipenser fluris) it is oval; in the ray and flark genera it is cylindrical, and in other fishes it is most commonly pyriform; the bulb is less muscular than the ventricle, but much more so than the artery; there is often a considerable layer of muscular fibres around it, which are continued upon the branchial artery. The internal part of the bulb is commonly made irregular by a number of strong longitudinal fasciculi. The membrane which lines the bulb produces some folds of a semilunar, or a parabolic form; these have their free edge turned towards the branchial artery, consequently perform the office of valves, in obstructing the return of the blood upon the ventricle. In the flarks there are two rows, of three valves each, the one at the orifice, the other at the termination of the bulb; there are also two rows in the flurgeon, the first composed of four valves, the second of five. In the ray genus, Cuvier reckons four rows, composed of the same number of valves, and in the genus gadus, the carps (cyprinus), and salmon (salmo), \&c. but two valves, placed at the entrance of the footstalk, and none at any other part.

Arteries.

We have already said that the heart of fishes is single, or consists only of an auricle and a ventricle; it consequently furnishes but one artery; this vessel is analogous to the pulmonary, as it conveys all the blood to the organs of respiration; being entirely subjacent to the functions of the gills or branchiae, it has been with great propriety termed the branchial artery.

This vessel arises from the bulb connected with the ventricle, of which it is in reality but the continuation, and from which, in some fishes, it is not very distinguishable.

In the skate (raja batis) the artery proceeds under the cartilage which joins the inferior extremities of the branchial
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2d branch of the artery of the brain goes forwards and
inwards, and again forms a junction with its fellow, and
the one which runs along the middle line of the lower surface
of the brain and spinal marrow. The 3d branch passes to
the origin of the medulla spinalis, and there gives off two
branches which extend to a vascular ring, produced from
the sides of the middle artery; the branch itself advances as
far as the eighth pair of nerves, where it sends off two other
branches, which unite to give origin to the middle artery
already mentioned. After producing this vessel the anterior
branch goes on distributing small arteries to the brain; it
pauses under the root of the fifth pair of nerves, to the tu-
bercles of the olfactory nerves, where it is expanded on
branches that spread in radii, or like the pessan scheme
of the portio dura. The intricate anatomomos produced by
this artery with its fellow, and with the middle vessel of the
lower surface of the brain, have been compared by Cuvier
to the Greek capital letter phi, accompanied with two semi-
circles affixed to it, in opposite directions, thus Φ. This
arrangement of the vessels of the brain may be considered as
analogous to the reticulo-sarcal of the carotid in quadrupeds,
and the circle of Willis in man. The artery which is distri-
buted to the brain in fishes appears, from its origin and course,
to supply the place of the vertebral artery.

The three trunks produced by the blood vessels of the
gills proceed inwards and backwards upon the inferior
smooth surface of the cartilage, corresponding to the cervical
vertebrae, and soon unite into one large vessel which is analo-
gous to the aorta.

At the place where these vessels are assembled to form
the aorta, there is given off a large branch, which cor-
responds to the subclavian artery, both in its situation, and
on account of the parts it supplies; it passes directly across
the cartilages which compose the pectoral member, or great
fin of the skillet, into which it enters, and immediately divides
into two great branches, which take the course of the broad
cartilage that forms the rays and muscles of the fin, the
one passing anteriorly, the other backwards, and each distrib-
uting branches in the direction of the muscles of the
fin.

The subclavian, according to Cuvier, furnishes posteriorly
a small artery, which goes to the ovary in the female, and
to the testicle in the male, and is analogous to the femoral.

Before the subclavian penetrates the fin it gives off a re-
markeable branch anteriorly, which passes along the fore part
of the gills; it there sends communicating branches to the
vessels that are immediately produced from the gills, and
likewise some which are distributed upon the gills themselves
for their nourishment, which are consequently analogous to
the branchial arteries of those animals which have lungs.
It detaches also, inwards, some arteries to the heart and
trunk of the branchial artery, which supply the place of the
coronary arteries; and, finally, it is lost in branches which go
to the muscles and parts about the upper jaw.

The aorta proceeds in a straight line upon the under sur-
face of the cartilages composing the dorso vertebral, on
which there is a groove for its reception, and when it arrives
at the tail it becomes completely enclosed in a canal, which
is made by the inferior spinous processes of the caudal ver-
tebrae.

Soon after entering the abdomen the aorta sends off the
celiac artery; this vessel passes backwards, and is distributed
in particular to the spiral valve of the intestines, to the liver,
and to the stomach. The first branch accompanies the
cylic duct to the commencement of the intestines, which it
penetrates very near the pylorus, in order to ramify to in-
finity upon the spiral valve: some of its small branches also
When the celiac has arrived at the internal edge of the stomach, it divides into two branches, one inferior, of which the ramifications are detached at right angles, from right to left, under the inferior surface of the stomach; the other is superior, and is distributed to the corresponding surface of the same organ, and gives likewise some small arteries to the left side of the spleen.

The next branch of the aorta is the mesenteric artery. It passes to the right of the spleen, to which it gives two large branches that enter at one side, and furnish at the other side arteries to the pancreas; it afterwards follows the right side of the intestinal canal, to which it is distributed. Its chief branches, to the number of nine or ten, detach themselves at right angles at nearly equal distances from each other, and cross and surround the intestine. The succeeding branches of the aorta are much smaller than the preceding.

The two first go to the commencement of the oviduct, which they furnish with many branches, particularly at the superior part; but before arriving there each of them tends an artery to the muscles of the spine analogous to the dorsal branch of the intercostals, or of the lumbers in mammalia.

A third branch furnishes some arteries to the spinal column and to the commencement of the kidney, and goes particularly to the oviduct.

A fourth artery arises from the aorta, and is sent exclusively to the kidney, at the side of which it detaches a small lumbar artery, which is distributed to the parietes of the belly, to the muscles of the spine, and to the vertebral column.

Three other arteries, having a similar definition, arise more posteriorly from each side of the aorta.

Finally, there proceeds from the aorta a large branch on each side; it soon sends off a renal artery, which advances the length of the kidney, distributing its branches to it, after which it continues its course outwards in the most posterior part of the abdomen, and produces an artery analogous to the epigastrie, and then escapes into the cavity, and is expended upon the anal fin.

The arterial fylum of fishes in general does not differ materially from that described in the skate; the gills being four, they consequently furnish one branch less than in the genus ray, or the shark. The aorta in some of the cartilaginous fishes, instead of passing in a groove as is usual, is contained in a canal formed in the bodies of the vertebrae; this is remarkably the case in the sturgeon (acipenser fluvius), and the lamprey (petromyzon marinus). The coats of the aorta adhere firmly to the sides of the canal, so that it would appear in these fishes the blood flows through the aorta as through a passive tube.

In those fishes which have ribs, the aorta gives off a number of branches to the intercostal spaces, which correspond to the intercostal arteries. These vessels, however, distribute branches to the kidneys before they pass to the parietes of the belly.

The splenic artery is not generally as it is in the skate, a branch of the mesenteric, but of the celiac, or that artery which supplies the first portion of the alimentary canal, the liver, and spleen.

Cuvier states that there are generally in fishes two mesenteric arteries, and describes them in the treat (falso faro).

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The first, or anterior mesenteric, he says, is detached from the aorta very near the middle of the body, and at a distance from the trunk of the celiac; it advances for a little way in the substance of the mesentery, and divides into two branches, of which the one goes forwards and the other backwards, parallel to the intestinal canal; it supplies with branches which form right angles with the artery that furnishes them, and which having arrived at the intestine, wind round it in a serpentine manner, and give off branches that extend forwards and backwards along it.

The posterior mesenteric artery arises from the trunk of the aorta at some distance from the first; it passes backward parallel to the intestine, and distributes its branches to the posterior portion of it: these go off at acute angles, and are not serpentine, as those of the anterior mesenteric artery. This vessel likewise sends branches to the bladder, which also receives others from the posterior intercostals.

Although the arteries of fishes have no peculiar origin, and are sent to parts differently constructed than those in mammalia, they bear considerable resemblance to the arteries of that class. From the preceding description it will be seen that almost all the arteries of fishes admit of the same names that are applied to the vessels of mammiferous animals.

The mode in which the aorta is formed in fishes, makes it impossible for the heart to communicate its impulse to the arterial system: the circulation of the blood in these animals is therefore carried on slowly, and unaccompanied by the pulse, or that salutary motion that is observed in the principal arteries of the hot-blooded animals: consequently also with the offices of these vessels, their parietes are thin, and appear to be deprived of the middle or contractile coat.

The arteries of fishes very much resemble in their structure the veins of other animals; they further agree with veins in the circumstance of having the branches of large capacity, and often as large as the principal trunks of the body.

In Plate IV. of the Anatomy of Fishes, Fig. 4, exhibits a view of the heart and branchial artery of the skate (raja batis); a, the ventricle of the heart; b, the auricle; c, the bulb of the branchial artery; d, d, the places at which the femoral valves are found; e, e, the two first branches of the branchial artery; f, f, g, h, their division into three branches defined for the three posterior gills; i, the continuation of the trunk of the branchial artery; k, k, the two branches in which the artery terminates; l, l, the two branches which go to supply the two anterior gills; the numbers m, m, n, n, indicate portions of the five gills which are left on one side, in order to show a little of the course of the branches of the branchial artery along their convex edges.

Fig. 5 of the same plate shews the formation of the aorta and some of its principal branches in the skate, the parts on the lower side of the body are cut away to bring into view the objects of the figure: a is the trunk of the returning artery (or vein, as it is often, though improperly, termed) of the anterior gill; b, the continuation of this vessel distributed to the front and external parts of the head; c, a communication between the returning artery of the first gill with that of the second, pointed out by d; e, the trunk formed between those proceeding to form the aorta; f, f, f, small arteries sent from this trunk to the muscles and other external parts of the head; g, the anastomosis between the two returning arteries of the second gill; h, the second artery of the second gill; i, i, the returning arteries of the third gill; j, their communication; m, n, the arteries of the fourth gill; o, their anastomosis; p, the branch of the first trunk sent to the brain; q, the second arterial trunk which forms the aorta; r, the arteries from the

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The gills united as the others by a cross branch; 2, the third arteral trunk which produces the aorta; 2, the commencement of the aorta formed by the confluence of the three arteral trunks on each side; 6, the branch of the aorta which corresponds to the subclavian artery; 3, the branch of this artery which goes forward, communicates with the external ends of the returning trunks of the gills, and sends off the branches analogous to the bronchial and coronary arteries, and others to the muscles of the jaws; 7, the division of the subclavian artery in order to supply the great pectoral fins or wings of this fish; 4, the caval artery, 2, the melaenitic; several small arteries are seen to arise from the succeeding parts of the aorta which go to the organs of generation, the kidneys, &c.

Veins.

The aperture by which the venous system of fishes terminates in the auricle of the heart is very small, in proportion to the size of that cavity, and to that of the adjoining trunk. The contracted opening into the auricle may, in a certain degree, perform the office of valves, or at least diminish the current of the blood upon the heart.

The common venous sinus with which the auricle immediately communicates, pales on each side transferably and backwards; it is formed, according to Cuvier, by the confluence of five principal trunks: 1, the posterior vena cava; 2, the trunk of the vena cava hepatica; 3, and 4, the two inferior vena cava; 5, a trunk which conveys the blood from the parts in the neighbourhood of the gills.

The posterior vena cava receives the deep-fated venous branches in the neighbourhood of the spine; the trunk itself accompanies the aorta, and, like that vessel, is included between the inferior spinal processes of the caudal vertebrae; and in those fishes which have the aorta lodged in a canal in the bodies of the dorsal vertebrae, as in the lampey (petromyzon), and theurgeon (acipenser), the posterior vena cava is accommodated in a similar manner; the posterior cava is in general an inconsiderable trunk with respect to capacity, it is however very long, and is without dilatation, being nearly of the same size throughout; this vessel is not described by Doctor Monroe, and appears to have entirely escaped his observation, although, from the number of species in which we have seen it, we believe that it is constantly to be found in this class.

The vena cave hepatica of the several lobes of the liver unite immediately before their termination in the common sinuses under the heart, they are always considerably dilated; Monroe states that in the flat (riga baits) they form between the liver and the heart finishes, the diameter of which is ten times greater than that of their openings.

The two anterior cava are the most important veins in the body; they receive the blood from a great part of the muscular substance of the fish, the organs of generation, &c. They lie contiguous to each other in the abdomen, and are greatly dilated. They form large receptacles of blood, according to Monroe, above the ovaries in the female, and the testicles in the male fish, at which place these veins communicate freely with each other.

The blood of the anterior and lateral parts of the body, especially in the flat hodanopterygii, and the fishes with large pectoral fins, is conveyed by trunks of some size, which correspond to the jugular and subclavian veins of other animals.

The latter trunk appears to be the continuation of the common sinus, into which the other trunks open by orifices smaller than the vessels themselves, the edges of which are prominent and leafy, or floating, so as to perform, in some degree, the offices of valves. Dr. Monroe says, that he observed within the external jugular veins, and at the termination of the internal jugulars, a pair of valves, similar to those in the veins of the human subject. At the termination of the renal veins, and large branches of the hepatic veins, he found single membranes fixed by threads from their edges, resembling the coronary vein of our heart; and at the termination of the other large veins, especially near the heart, he says, there are not only constricted orifices, but doublings at their edges, which have so far the effect of valves, even in the dead body, that we cannot fill completely all the veins, by throwing an injection in at one of their branches. Page 18. Monroe's Physiology of Fishes.

It should however be observed, that the veins of fishes are not valvular in their course, like those of mammalia.

It is unnecessary to give a particular description of the venous branches, which produce the trunks above-mentioned; these, as far as we have observed, accompany the ramifications of the arteries, and are single vessels of a somewhat greater diameter than the artery.

The coats of the veins of fishes are extremely fine and thin; fo much so, that they would seem to be incapable of suffering much dilatation without being ruptured.

We have frequently observed that the veins of fishes appeared as if they were in a great measure emptied of their blood, particularly in the dilated parts of the anterior cava, which vessels would seem to have a capacity beyond their usual contents; the great size of the principal venous trunks of fishes is therefore, probably, not so much the consequence of long continued dilatation, as original organization. It appears to be a circumstance in the structure of these animals, adapted to the flow motion of their blood, and not as Dr. Monroe supposes, dependent upon the pressure of the water on the surface of their gills, causing an accumulation of the blood in the interior parts of their bodies. The existence of several venous trunks for collecting the blood from the smaller branches appears also to be a provision to obviate the faults which would arise, if all the blood was slowly accumulated in one or two trunks.

Fig. 4. Plate IV. of the Anatomy of Fishes, presents a view of the principal venous trunks in the flatfish (riga baits); 4 is the common sinus, in which all the veins meet, seen passing from each side behind the articule into which it opens; 6, a part of the vena cave hepatica taken out of the liver; they pour their blood into the sinuses, opposite to the auricle; p. p. the two anterior vena cava; g, the place at which they communicate with each other; a and s, the veins analogous to the internal and external jugulars; at the trunk, which corresponds to the subclavian veins, a, v, two branches of the subclavian, which collect the blood from the great pectoral fins, x, a large vein from the muscles, and other parts behind the abdomen, which opens into the subclavian.

Vital Temperature.

All the hot-blooded animals possess a degree of temperature suited to the functions they naturally perform; which cannot be materially altered without inconvenience to them; and any considerable deviation from which is resented by an effort of their vascular system; this we have termed their standard heat. The temperature of fishes, both from their organization, and the element they inhabit, is in general low; one of their chief characters is being cold blooded. There is however a good deal of variety in the natural temperature of different species; those that live in the sea are some degrees colder than the fresh-water fishes; and those...
tho' those that are alive, and frequent the surface of the water, as many of the genera _cyprinus, salmo, &c._ have a higher temperature than the more sluggish species. We may state the standard heat of the one kind of fishes to be about 60° of Fahrenheit's scale, and that of the other about 50°.

As the vital heat is less independent of the external temperature, in proportion to the lowness of the standard, or, in other words, as the heat of the animal is more inconstant when it is not naturally high, we find that the temperature of fishes, commonly, is nearly the same with that of the water in which they reside. In some experiments we made upon _carps_ and _els_, we did not discover any material difference between their heat, and that of the water in which they were placed, until the latter was heated, or cooled, many degrees beyond its ordinary temperature.

Mr. Hunter's experiments on this subject were attended with a similar result, although they appear somewhat inconsistent with each other, as he has stated them.

Upon one occasion he put an _el_, its heat being 42°, which was nearly that of the atmosphere, into water heated to 65°, for fifteen minutes; and upon examination it was of the same degree of heat with the water. In another experiment, he says, he put a _turbid, _white heat was 63°, into water at 65°, and after remaining there ten minutes, the ball of the thermometer being introduced both into the fish and rectum, the quicksilver rose to 52°.

Having removed a _turbid_ out of a pond, the water of which he had ascertained to be 67° and a half, he introduced the thermometer into its rectum; the quicksilver rose to 69°; so that the difference between the water and the fish was 6° and a half.

These two last experiments do not quite accord with the two following. Having put an _el_, the heat of whose mouth was 30°, into a freezing mixture, its temperature fell to 0°. The animal, he says, at that time appeared dead; but was alive the next day. He took a living and dead _turbid_, and a living and dead _el_, and put them into warm water; they all received heat equally fast: and when they were exposed to cold, both the living and the dead admitted the cold likewise with equal quickness.

It is beyond all doubt that fishes readily suffer great alterations in their natural temperature, and that this is not attended with any fatal injury. It has been ascertained that they can be even entirely frozen, and afterwards restored to life; and it may be credited that the freezing of the fish in the Philippines, and fishes swim in the heat of 187° of Fahrenheit.

Mr. Hunter affirms that he never succeeded in freezing whole fishes, and afterwards recovering them; although his experiment of freezing the _el_, as above-mentioned, would lead us to make a different conclusion. He froze, he says, the tail of a _turbid_ (as high as the anus), which became as hard as a board; when it thawed, that part was white, and coarse, and when it moved, the whole tail moved as one piece, and the termination of the frozen part appeared like the joint on which it moved.

He also froze the tails of two gold fish until they became as solid as a piece of wood. They were put into cold water to thaw, and appeared for some days to be very well; but that part of the tails which had been frozen had not the natural colour, and the fins of the tails became ragged. About three weeks afterwards a fur came all over the frozen parts; their tails became lighter, so that the fishes were suspended in the water perpendicularly, and they had almost lost the power of motion; at last they died. The water in which they were kept was New River water, changed every day, and about ten gallons in quantity. See Hunter's Animal Economy.

From these experiments it would be inferred, that even parts of fishes will not admit of being frozen without disorganization.

**Ornament of Respiration.**

All truly aquatic animals possess certain parts of a laminated or tufted structure for minutely dividing the water, and extracting from it the air with which it is intermixed. The gills of fishes are peculiarly well contrived for this mode of respiration, both from their position and organization. The gills of fishes are fixed on each side of the neck; they have always a very free communication with the cavity of the mouth, of which they may be generally considered as constituting the posterior parries. They are covered externally in the _chondropterygi_ by the common integuments, and in the other fishes usually by a boy or cartilaginous operculum, which is, in most instances, increased by the addition of some radiated bones that are covered by a procbls of the skin.

In the _chondropterygi_ the gills are fixed by being connected externally to the integuments that enclose them, which are perforated by a number of foramina, varying according to the genus; but in the other orders of fishes the gills are unattached at the external side, and the branchial aperture is finge and capable of being much enlarged and diminished by the elevation and depression of the operculum, which is moved by certain muscles in the manner of the lid of a box.

The branchial arches are furnished upon some cartilaginous or pinnate arches, which are placed so that their cavity is turned obliquely forwards towards the mouth, and their convex sides are directed backwards and outwards. These arches are constructed to admit of their bashes being contracted and dilated, and of being approximated one with respect to another; for which purposes they are provided with numerous and complicated muscles. The motions of the branchial arches are also connected with those of other parts in their neighbourhood; the pharyngeal bones, hyoids, &c. although chiefly intended for deglutition, enter into the mechanism of the respiratory organs; and the branchial arches on the other hand are employed in deglutition; so that all the parts situated about the origin of the oesophagus have complicated functions, as will appear when they are more fully described along with the other organs of motion. It is insufficient at present to state, that by the motions of the different parts with which the branchial arches are connected, their vascular surfaces are expanded, contracted, and pressed against the water, which runs over them.

The real organs of respiration in fishes are the great number of laminae which are fixed upon the convex sides of the branchial arches. These laminae in the _brachii_ and _oecus_ fishes are arranged in two rows upon each branchial arch, of which there are generally four on each side. The laminae are very narrow, elongated, and pointed at their free extremity, and are usually united to each other by their internal edge for about two-thirds of their extent from the base; they are commonly fixed to each other, producing the appearance, in a very great degree, of the teeth of a comb, or the barbs of a feather. Each of the laminae contains a very delicate plate of a cartilaginous structure, by which they prefer their form and position against the force of the water. Their superficialis is to the long the edges, but we have lately discovered that the intermediate surface is covered with extremely fine thin villous processes, by which means the respiratory surface is infinitely extended.
The branch of the branchial arch, which proceeds along the convexity of the arches, furnishes to each pair of laminae two vessels; the larger of which is inserted into the internal edge of the lamina, and the other runs along the external edge and distributes branches, which supply the blood to the laminae for the aorta. The artery of the internal edges anastomoses at some distance from the extremity of the lamina, with a branch which passes transversely from one lamina to another, and thus establishes a communication between all the internal branchial arches of the branchial artery. The minute or ultimate ramifications of the branchial arches are supplied by the small or subordinate laminae, which arise from the sides of the other.

Cuvier describes the branch of the hiipraepax as being differently organized from those of other fishes. They are composed of eight rows of tufts united by pairs in such a manner as to correspond with the four ordinary gills. The external rows have only five tufts; those which succeed have six; there are seven in the third; and in the middle rows there are eight tufts. The consequence of this being a different number of tufts in the several rows is, that the entire gills appear of a round figure. Each of these tufts, of which the extremity is round, is formed of a cartilaginous lamina, which is fixed upon the branchial arch; and others, in the ray genus, some other little membranous vascular lamina, very distinct from each other, and arranged upon the cartilaginous lamina, in the direction of the branchial arch.
rows of lamina are placed with respect to each other in the case; a, is the branchial arch cut transversely; b, the section of the branches of arteries which transmit the blood to the gills, and return it afterwards to form the aorta; c, a lamina of each row crossing each other, which is the position they have in this fish, in which they are not united to each other. Fig. 8. of the same plate, presents a single lamina of the case, considerably magnified, in order to show the villous processes we have discovered to exist upon its surface. Fig. 9. is a lateral view of a portion of the gill of the flate (pogge botitis); a, the basis of the gill or branchial arch; b, the surface from which the lamina proceed, and to which they are connected by the greatest part of one of their edges; c, the fine edges of the laminae. Fig. 10. of this plate, shows one of the lamina of the first order of the flate, magnified; a, the border which is attached; b, the edge which floats, is seen furnished with villous processes; c, the intermediate surface, covered with fine subordinable lamiae.

Fish.

Kidneys and urinary Bladder.

These glands usually bear a greater proportion to the size of the body in fishes, than in any other class of animals. They not only extend the whole length of the abdominal cavity, but often pass as far forwards as the sides of the coelophagus, and back of the cranium, and sometimes go backwards along the spine, considerably beyond all the abdominal viscera. They are proportionably small in the ray and flarks genera.

The kidneys are always closely applied to the surface of the vertebral column, from which it is difficult to remove them; the surface, which is next to the spine, is consequently very irregular, particularly in offious fishes. The greatest part of the kidneys is covered on the upper surface, by the air-bladder, when this organ exists.

The form of these glands is somewhat various; sometimes, as in the carp, &c. there is a transverse lobule on the external side of each kidney, at the anterior part, which gives them an uniform figure. This lobule projects obliquely from the internal side in the dory (zeus faber). The kidneys are sometimes of nearly the same breadth at every part; in other instances they are considerably smaller anteriorly. They are generally but imperfectly divided into lobules, which gives an obscure notched appearance along their external edge; there are two posterior lobes which project backwards for a greater or lesser distance.

The proper coat of the kidneys is extremely thin. On the under surface they are covered by the peritoneum, which closely adheres to them.

The usual colour of the kidneys is a dark reddish brown. Their texture is soft and fragile, and yields equally in all directions to the pressure of the fingers. In the ray and flarks genera their substance is formed of a lighter red colour than in offious fishes. In every instance the kidneys have an uniform structure. They are very vascular, being supplied by numerous arteries from the adjacent trunks.

The unirhena ducts are numerous, and distributed throughout the whole substance of these glands. They are, at their commencement, fine and transparent; but as they become larger their coats appear opaque, and of a silvery hue. There are no cells or retevors in the interior of the kidney, into which the unirhena canals pour out their fluid, as in mammalia; these vessels coalesce to form the ureters, as in birds and reptiles.

These ducts run generally along the under surface of the kidneys, imbedded in their sublamine, and acquire magnitude as they proceed. In the fqualus maximus, according to Mr. Home, they run along the inner edge of the kidnies.

An urinary bladder, such as exists in other animals, is wanting in a great number of fishes; but in its place we generally find a dilated canal into which the ureters open. This canal is sometimes so wide as to approach the appearance of a sac or bladder; it is generally capable of containing a certain quantity of urine. Its coats are stronger than those of the proper urinary bladder, and it is often plicated or laminated upon the inner surface.

When the urinary bladder exists, it is a thin pellucid bag. It is found in many cartilaginous fishes, as the fregfish (lophius pescatorius); the lamp fsh (cygapturus lumps); moon fsh (stroodon molis). &c. &c. and the number of offious fishes in which it has been observed to exist is much greater. In the carp (cyprinus carpio) the bladder is of a spherical shape; in the father-loffer ( cottus foirinus) it is more elongated in its form, and of considerable size in proportion to that of the fish to which it belongs.

The urinary bladder discharges its contents usually by an opening distinct from the anus, and placed a little farther back than that aperture.

There is no proper urinary bladder in the ray and flarks genera. The ureters terminate in a cloaca as in birds. Mr. Home has, however, observed in the basking flark (fqualus maximus) that the ureters terminate in an oval cavity just within the verge of the anus, which has an imperfect septum separating it into two parts, the ureters opening on the opposite sides of this septum; this cavity must, therefore, be considered as the urinary bladder. This cavity opens externally in the male, by an infundibular process which corresponds to the penis. Dr. Sor Monroes has likewise called the part which conveys the urine into the cloaca in the common flate the urinary bladder.

It is impossible to assign the use of the bladder or any refervoir for the urine in fishes; these animals continually resinding in the water, one should have supposed that no inconvenience could have arisen from the expulsion of their urine as fast as it was secreted; perhaps part of their urine is absorbed, as in other animals, and carried back into the fyst, for which purpose it is necessary to detain it for some time before it is ejected.

No accurate examination has been made of the chemical properties of the urine of fishes, as far as we are acquainted. Although exceedingly transparent, it possesses more of the urinous flavour than the contents of the bladder in reptiles; it may, however, be questioned, how far the fluid found in the bladder of reptiles is really urine: this will be considered in its proper place.

Anatomists have agreed in denying renal glands or capsules to the whole class of fishes; there are in the dory (zeus faber) two ah-coloured glandular bodies, about the size of small peas, placed upon the posterior extremity of the kidnies; these glands are of a firm, tough, tender, not susided throughout one, and are attached to the kidnies, and also to the posterior end of the air-bag, by some ligamentous-looking cords. We have not yet examined other fishes; we are, therefore, not prepared to say how far these glands may be compared with the renal capsules of other animals, or whether they may be not connected with the offices of the air-bag in this particular fish.

Fig. 11. of Plate IV. in the Anatomy of Fishes, represents the dilated canal, which takes the place of the urinary bladder in the dory (zeus faber); a, a, are portions of the two ureters which end in the fundus of the sac; b, the wide part

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of the canal; c, the contracted part, which goes on to terminate behind the anus; the canal is laid open to shew that it is plicated on the inner surface.

Organ subservient to the generative Functions.

Male parts of generation.—If we except the borders, or organs of protection, in the genera 
raja and fuguus, there are no external parts of generation in the class of fishes. From the manner in which these animals in general accomplish the act of generation, a penis would be perfectly useless to them, and the organs for preparing the male semen would be exposed continually to injury, if placed on the outside of their bodies.

The parts reputed to be the organs of protection in the ray and fuguus kind, are situated at the sides of the anus, between the two ventral fins. They consist of three parts, articulated with the pelvis, resembling additional abdominal members. They are composed of thirteen cartilaginous joints, of different sizes and figures, which are moved by certain muscles covered by the common integuments, and connected with a singular gland.

The first part is formed by three short cartilaginous pieces, articulated one to the other. The second part is likewise composed of three cartilages, which are long, and not moveable upon each other. The two external pieces interrupt a canal which proceeds to open in a hollow formed in the third part. This canal is made up of seven cartilages, all moveable on each other; it receives likewise one of the pieces of the second part, which goes on as far as its extremity.

The second part admits of flexion outwards upon the second, and of extension, and the whole member is moveable from without inwards. These motions are performed by the means of two muscles. One of these arises from the pelvis and terminates at the commencement of the second part. It is covered with the flexor of the ventral fin. The other muscle is smaller, and placed upon the first; it arises from the first part, and is inserted at the commencement of the second.

There is a third muscle which takes its origin from the third part, and envelopes the second, except a small portion of its external side, and is inserted by a flender tendon upon the inferior and external side of the last piece, and is affixed at the superior side to an extended border that is presented before the piece, which has the figure of a blade. The use of this muscle is to open the canal already mentioned, which is closed by the elasticity of the parts composing it.

The gland is situated at the exterior of the middle part of this apparatus. It is an oval figure, and surrounded by a thick muscle; it furnishes a very viscid fluid, and its excretory duct opens into the groove that is formed by the two cartilaginous pieces of the second part, and is lost in the hollow of the third.

Naturalists are not agreed with respect to the use of these singular members. Cuvier thinks that they are only employed in swimming, as the large one of their muscles is also the depressor of the ventral fin, and as their parts are not provided with muscles, to be approximated with sufficient force to act as organs of protection. Bloch, and many others, supposing that they were designed to hold the female during coition, Geoffroy believes that they are introduced into the cloaca of the female, and perform the office in some degree of a penis. We are not inclined to adopt the last opinion. If this apparatus was intended for swimming alone, why should it be peculiar to the male? And if for protection, a gland to secrete a viscid fluid would not only unnecessary, but inconvenient. The ray and fuguus genera should therefore, perhaps, be considered as exceptions to the general observation, that fishes do not possess a penis.

The testes of the genera raja and fuguus differ very much from those of other fishes; they bear a greater resemblance to the same organs in some reptiles than to those of their own class. Each testicle consists of two parts united together. The one is an uniform glandular mass, somewhat like the texture of the testicles of other fishes; it is flattened and imperfectly divided into lobes. The other portion is made up of a great number of small spheric bodies, on the external surface of each of which there is a slight depression, like an impreffion made by the head of a pin; these bodies are united to each other by some strong filaments, and are included in a fine membrane. This tubercular substance forms the principal portion of the gland, and is divided into several lobes or masses of different sizes. When examined with a magnifying glass it appears to consist of very minute round grains.

The testicles of these fishes give origin to a real epididymis, which is evidently composed of a convoluted tube. It is thin, where it is connected with the gland, with which it appears to be continuous; it forms a large mass of an oblong shape.

From the lower part of the epididymis the vas deferens proceeds forth; it is a canal of considerable size, and as it proceeds along the spine, towards the anus, forms a great number of sigmoid figures or coils upon itself. These become less sinking, and the duct enlarges as it approaches a fissure near the cloaca, in which it terminates in such a manner, that although they form a common receptacle, there is not a free communication between them.

Monroe states that these fisc contain a green coloured fluid, and he considers them analogous to the prostatic gland; they appear to us to correspond much more with the vesiculae feminales, if they be looked upon as any thing more than a dilatation of the vas deferens. Monroe describes the dilated part of the vas deferens, before its communication with the fusc, as a vesicula feminina, in which he is evidently wrong. He was led into this error from considering the vesicae femininae of mammalia as mere reservoirs of the fisc.

The vas deferens and fusc of each side open into a cylindric papilla, which is visible in the cloaca.

The testicles of the other orders of fishes are two elongated bodies, sometimes cylindric or conic in their form, but most commonly injected or divided into ovoidal bodies; they are of a pearl grey or ash colour, soft, pulpy, and homogeneous in their texture, resembling very much medullary substance; their surfaces renders their intimate structure very obscure, but they appear to be composed of an intertexture of fine membrane and pulvaceous matter. They do not furnish any epididymis, nor, properly speaking, a vas deferens; but open at their posterior extremity almost immediately at the foramen, behind the anus, which is a common opening for transmitting the urine and fisc. The testes of fishes are popularly known under the name of the milt or soft row.

These glands increase remarkably in size during the feaon that the females expel their ovum: they are then full of a white thick fluid, like milk, which is no doubt the male semen. At this period they make so material an addition to the bulk of the body of fishes, that these animals are then only fought after as articles of food.

In Plate V. of the Anatomy of Fishes, fig. 1. exhibits a view of the generall organs in the male fish (raja batis); a is the white medullary portion of the testicle; b, the tubercular portion; these parts are cut away on the opposite
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site side to abridge the size of the figure and expose other
parts. $c$, the epididymus of each side; $d$, $d$, the vasa
deferentia; $e$, $e$, the faces in which the vasa deferentia termi-
nate; the one on the right side is laid open to expose its
cavity and connection with the vas deferens; $f$ is the
circular papilla upon which the conduits of the femail termi-
nate.

Female organs.

In the genera *Raja* and *Spalaxis* these parts are more pecu-
liarily formed than even the male organs of these fishes.
They resemble in a very great degree the female organs of
birds.

The ovaries of these genera consist of clusters of round
eggs of various sizes and different shapes of growth. The
membrane which envelopes the ovaries nearly surrounds each
of the ova, which therefore, especially when mature, appear
distinct and have some liberty of motion. These ova conjoin
only of the yolks, and are of a pale yellow colour. In their
mode of growth, connection with the ovary, and man-
ner of exclusion from it, they very much re semble the
*vitreus vitellorum* of birds.

Although in these genera there are two "oviducts", they are
conjoined at their extremities to form a single aperture, which
is placed immediately behind the septum that divides the
branchial and abdominal cavities. This part of the "oviducts"
may be considered as analogous to the *infundibulum* in birds.
The ovarian tube of each side at first proceeds for some way
outwards and backwards, at which place its canal is
finally, and its processes thin and pleated longitudinally up
on the inner surface. It then suddenly enlarges, and incloses
in its coat a large glandular mass, something between a
square and kidney shape; this body is composed of a num-
ber of white tubes, which are so divided as that their ends
are turned towards the cavity or internal part of the gland;
at one side of this mass there is the appearance of a spiral
of tubes or fibres, which crosses the other structure, and is prob-
able a muscle for contracting the cavity. The internal
membrane of this part is smooth, and so thin and transparent
that the tubes are very visible through it.

The interposition of so large a gland in the course of the
ovarian duct is unquestionably for the secretion of that
remarkable "bony covering or shell" which is found on the ova
the fish, and yet it should be observed, that we have
not been able to discover the orifices of the tubes upon the
internal membrane of the oviduct, nor have we succeeded in
expressing the smallest quantity of fluid from the tubes into
the cavity of the gland.

The portion of the oviduct which succeeds the gland is
greatly dilated, its processes are thin, and the internal sur-
face (on the face at least) is covered with fine transverse
folds, or rather linear impressions, not resembling the place of
an interline, which are thin productions of the internal
coat.

The oviduct terminate by a corrugated or puckered
opening on each side of a conical-cylindrical cavity, within
the anus, which some authors have described as a *uterus*,
and others as the *coalica*. The latter name appears to be the
most correct; as this cavity receives the urin, and comnic-
cates with the rectum. The orifices by which the ovi-
ducts terminate in the cloaca are surrounded by mucous
glands.

In the genus *Kleina* there are first some small ducts, of
which the extremity attached to the ovaries is open and
composed of which the extremity attached to the ovaries is open and
spiral out. After a short space they suddenly enlarge, and
form a considerable glandular mass, of which the branches
of tubes that compose it are perpendicular to its parietes
From these glands to their termination the oviducts are
membranous, and of great capacity; where they terminate
they are conjoined and open externally by one common
 aperture.

In the *offensive and in the cartilaginous fishes*, except those
already described, the ovaries consist of two membranous
faces or bags, the cavity of which is occupied by numerous
leaves, formed by reflexions of the membrane; the folds
are usually placed transversely; they contain the ova
within their duplicature; they are copiously supplied with
blood-vessels, and exhibit (especially after injection, with
a coloured fluid) a very beautiful and variegated foliated
appearance.

The ovaries of different offensive fishes are of various forms;
they are usually elongated and pointed at either end. In the
*dog* (Zeus Faber) they are flat, and approach a square
figure; in many fishes they have four corners, which are elon-
gated forwards and backwards. In some of the *pluranectidae*
and in some other fishes, a part of the ovaries is extended
backwards in that process of the abdominal cavity which is
continued along the external parts of the spines of the
caudal vertebra.

We have observed but one ovary, of a pear shape, in the
*perch* (*Perca fluviatilis*); perhaps some other fishes may be
found to have single ovaries.

The ovaries of offensive fishes increase prodigiously during
the season for depositing their ova. At this period they
increase in size all the rest of the viscera; although after the
season of spawning they are the smallest viscera in the body;
the variations in their bulk depend upon the number of ova
they contain, for their parietes are at all times nearly of the
same thickness.

Fishes in general surpass all other animals in fecundity.
M. Rouftee, a laborious French anatomist, has taken the
pain to reckon the number of ova contained in the ovaries
of several species. He found in the *furzeon* (Acipenser fluviatilis)
146,785 eggs; in the *mackerel* (Scomber ondourus) 129,000;
in the *perch* (*Perca fluviatilis*) 69,216; in the *carp* (*Cynicus
carpio*) 107,450; and in the *pike* (*Esox lucius*) 30,450.

The ovary of those fishes which are not viviparous are all
small, and of the same size; they are generally about the
bulk of pin heads. They are not expelled from the ovary in
secession, as in the *Chelon, Trachurus*, but in large quantities,
like the spawn of frogs; which they further resemble in being
impricated, and undergoing their changes outside the body
of the parent.

Except in the viviparous fishes also there are no oviducts;
the ovaries terminate immediately at a particular aperture
placed behind the anus.

From the preceding description it will be perceived, that the
mode of generation in the genera *Raja*, *Spalaxis*, and *Kleina*
is essentially different from that of fishes in general. In those
genera the eggs do not leave the ovary until they acquire
a considerable magnitude; their structure is completed in their
passage through the oviducts, in which also they are most
probably impregnated. During the residence of the egg in the
oviduct its contents are changed in their organization,
and the fetus is formed in the same manner as during the
incubation of the egg of birds; and when the ovum is
discharged from the body of the fish, the fetus, its parts, and
admits the water in which the fetus floats, filled nourished by
the yolk which remains attached to its interior.

At this period we have discovered that their exit is
provided with external branchial appendages exactly similar
to those met with in the tadpoles of some reptiles. It is

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When these fall off, and the yolk is consumed, that the young fish seeks its own sustenance.

The shells of the eggs of the *rana* and *fishus* genera, after being evacuated by their inhabitants, are commonly from their lighter end on shore, and are found in some places under the name of *sea bits*. For a further account of the history of the ovum, and the changes it undergoes in fishes, see the articles OYUM and INCUBATION.

The second figure of Plate V. of the Anatomy of Fishes, gives a view of the female organs of the *pate* (*rana latos*); a, the first portion of the ovarian tubes; b, their junction and aperture, by which they communicate with the cavity of the abdomen; c, e, the glandular bodies; the one on the right side is laid open to show its composition to be of tubes; d, d, the succeeding portions of the oviduct, which are very capacious, and perform in some respects the offices of uterus; e, a mature egg seen in the enlarged part of the oviduct; f, f, the ovaries containing eggs of various sizes; g, g, the termination of the oviducts in the cloaca; b, the cloaca; the opening by which it receives the urine; k, the anus.

Organs employed in the Excretion of the animal Functions.

Brain.

The dura mater in fishes resembles very nearly the common pia mater; the distinction of two layers is not evident; and those broad reflections of the internal layer which exist in mammals for separating the different divisions of the cerebral mals are wanting. The dura mater approaches, in the large fishes, nearly to a cartilaginous nature.

As the cavity of the cranum is much larger than the brain, there is a considerable space left between them, which contains a quantity of gelatinous matter in the cartilaginous fishes, and commonly an oily fluid in the efferent fishes. There is also a considerable quantity of salt water found in the cavity of the cranum, which has been supposed by doctor Monroe to be sea water carried thither by absorption, as we have mentioned in speaking of the salt liquor met with in the cavities of the abdomen and pericardium of fishes.

The fluid of the cavity of the cranum is very frequently flavened by admixture with blood, which appears to be extravasated in it in small quantity.

These fluids are contained in a very loose cellular texture, which corresponds to the tunica arachnoidea of other animals. Monroe found the surface of the brain covered with a number of small pheroidal bodies; these are probably contained in the tunica arachnoidea.

The pia mater closely invests the surface of the brain as usual; it likewise lines the ventricles, and produces a plexus analogous to the choroid plexus; which however does not float in the cavity of the ventricles. Cuvier describes also two other productions of the pia mater, situated in the fourth ventricle, which appear to be at liberty.

The brain of fishes parallels the characters described in that of birds and reptiles in a still more remarkable degree than this organ in either of those classes. It is very small in proportion to the size of the whole body, and bears even a greater disproportion to the bulk of the nerves which arise from it. Cuvier states the proportion of the brain to the rest of the body to be as 1 to 2456 in the white fish (*fishus carbo*), 1 to 1344 in the great dog-fish (*fishus caninus*), 1 to 1356 in the *pike* (*fox lucius*), 1 to 350 in the carp (*eigrinus* *carpi*), 1 to 1817 in the *silurus glanis*. The greater size of the brain in the carp accords with the well known docility and intelligence of that species; and the small proportion which the brain of fishes generally bears to the size of the body, is what might naturally be expected from the dulness and incapacity of this class of animals in general. On looking at the brain of a fish one is struck with its dissimilarity to the cerebral mals of man or quadrupeds; it appears like a succession of tubercules scarcely conjoined together: the eminences which nearly correspond to the cerebrum and cerebellum are not distinguished from the others, which give origin to the nerves, and in some cases might be overlooked from their being smaller.

The cerebrum is always composed of two hemispheres, as in other animals; it is smooth and without convolutions: those parts called corpus callosum, fornix, &c. cannot be distinguished at the junction of the hemispheres.

There is a cavity in each hemisphere which corresponds to the lateral ventricle; it is not, however, prolonged and reflected so as to form those parts termed *bursa* in mammals.

The floor of the ventricles is plain in the ray and *fisk* genera, but in most other fishes there is an elevation, usually of a semicircular figure, from the external or convex side of which a number of medullary *flutes* go off in a radiated manner upon the internal parietes of the ventricles: this eminence corresponds to the corpus striatum; it varies with respect to size in different species, and also sometimes in its figure: according to Cuvier it forms in the *calotis* (*calotis merlangus*), an elevated oval body.

Between the corpora striata there is a small chink, which opens into the third ventricle.

The anterior commissure of the brain is situated a little below these eminences.

There are some tubercles within the hemispheres, which Cuvier considers analogous to the tubercula quadrigenes, although their situation is not the same. They are placed, as in birds, before and above the thalami nervorum opticos.

In the genus *eigrinus* there are four of these tubercles, two anterior and two posterior; the former are extremely long, cylindric in their shape, and bent outwards and backwards, taking the curvature of the lateral ventricles, the cavity of which they fill: they are marked posteriorly by a longitudinal furrow; the posterior tubercles are round, and much smaller than the anterior.

The col (*murena anguilla*), badcock (*gadus eglephus*), and herring (*clupea barbata*), have but one pair of these tubercles, which produce a remotic eminence before the cerebellum, between the posterior extremities of the corpora striata. The *pike* (*fox lucius*), trout (*salmo fario*), salmon (*salmo salar*), and perch (*perca fluviatilis*), have four tubercles which are distinct, round, and small; the posterior pair is larger than the anterior. These tubercles are not found in the ray and *fisk* genera.

The *thalami nervorum opticos* are two distinct tubercles situated below the hemispheres, as in birds; each of them likewise contains a ventricle.

The cerebellum is generally large in proportion to the cerebrum, and in some instances even exceeds it in size: it is sometimes rugous on the surface; it is always a single tubercle without lobes, and usually of a heart shape, the apex of which is turned backwards; sometimes the superior part is the most prominent. When the cerebellum is cut into, the section it exposes some indistinct pale coloured lines; but that arboriform arrangement of medullary substance, called *arbor vitae*, does not exist.

The fourth ventricle is generally large; with respect to the other cavities of the brain, it not only passes under the cerebellum
cerebellum as usual, but ascend for some way in its sub-

flance.

We have next to consider those additional tubercles of the brain of fishes upon which its character depends, and which constitute in general the greatest part of its bulk; they are placed before the cerebrum and behind the cere-

The anterior tubercles give origin to the nerves, which go to the organ of smelling; they are therefore commonly named the olfactory tubercles. They are usually a single pair. In the ray and shark genera they are united and form one mass, which extends in fize all the rest of the brain: the figure of this mass is a little variable, and is difficult to describe. In the thornback (roja elevata), it is somewhat of a triangular figure, one of the files or the base being turned forwards; in the lesser dog fish (scylius catulus) the fore part is circular, and the back a little concave in the centre. The olfactory tubercle in these fishes has been described by some authors as the cerebrum, and by others as its anterior lobes.

The olfactory tubercles are long and narrow in the Sturgeons (acipenser fluviatile); they are oval masses, smaller than the hemispheres in the lamp-fish (Cyclopterus lumpus), and in the moon-

fish (teledon melas). In the genus Gadus they are round, and in the cod (Gadus morhua) they are nearly as large as the hemispheres: according to Cuvier they are round and elongated on one side in the swaffiis (labrus), and in the carp (cyprinus); but Ebel and Scarpa have delineated them in the common carp (cyprinus carpio), of an egg-shape; they are oval in the Silurus glanis.

There are four olfactory tubercles arranged in pairs in the flat fishes (pleuronectes), the herrings (elupea), the pikes (esox), the perchs (perca), and in the genus Silurus; the anterior pair is in the common pike (esox lucius) so small, that they might readily escape observation; the posterior pair, although larger, are not equal in fize to the hemispheres.

In the eel (genus anguilla), there are three pair of olfa-
tory tubercles; the first pair are then mall; the second somewhat larger; and the third, or posterior, considerably the largest, being about the magnitude of the hemispheres.

The olfactory tubercles do not in any species contain a ca-
vity or ventricle.

The tubercles situated behind the cerebrum are peculiar to the clafs of fishes; they are in general a single pair, but in some species there is a third single tubercle placed in the middle immediately before the other two, and behind the cerebrum.

Some anatomists suppose that the lateral tubercles are analogous to the corpora olivaria of mammals, and the mid-dle tubecl has been described as a second cerebellum: the latter is evidently erroneous; but the former appears to be perfectly well founded: the corpora olivaria and these tubercles correspond both with respect to situation and in giving origin to the posterior nerves of the brain: it would be more correct, however, to lay that the corpora olivaria and these tubercles are the tubercles on an abridged scale.

The posterior lateral tubercles are large and irregularly furrowed in the ray genus. In the whiting (gadus merlangus), and the cod (gadus morhua), the tubercles are oval, and placed above the medulla oblongata. They are similar in the common and coarser eel (muraena anguilla and m. conger); they are inconsiderable in the pike (esox lucius), the salmon (salmo salar), the trout (salmo fario), and the perch (perca fluviatilis).

In the carp (cyprinus carpio) the posterior lateral tubercles are extremely large; they equal in fize the hemisphere of the cerebrum; they have somewhat the figure of kidney.

The fifth likewise poises the middle tubercle, which is large, and of a round figure.

There are no cavities in the posterior tubercles of fishes.

There is nothing very peculiar to remark with respect to the origin of the nerves in fishes.

The olfactory nerves are produced from the tubercles placed before the cerebrum, as already mentioned; they generally appear as the continuation of these tubercles; this is particularly evident in the ray and shark.

In the carp and Silurus glanis, &c. the olfactory nerves arise by two or three filaments from the tubercles. The optic nerves take their rise, as usual, from the thalamus nervorum opticorum; immediately after their origin they decussate, or cross each other. In oblong fishes this is most obvious; in which the optic nerves may be seen lying one arcoss the other, and only connected by cellular substancs.

The right nerve goes to the left eye, and the left nerve to the right eye. Many anatomists have supposed, in consequence of the decussation of the nerves being so palpable in fishes, that something of the same kind takes place in other animals, by which they have explained the sympathy that is well known to exist between one eye and the other, in the superior animals; there is, however, sufficient connection between the two sides of the brain, to account for the sympathies of the organs of vision, without ascribing it to the decussation of the optic nerves.

Ebel and Scarpa have stated, that in some fishes the optic nerves have an investment of pia mater, containing very elegant longitudinal folds.

The third and fourth, and fifth pair of nerves arise as near as may be from the same parts of the brain which furnish them in mammals.

The fifth pair are produced by a common trunk with the poria dorai of the fesenthe pair, is quite distinct from the auditory; and arises in common with the par vagum, or the eighth pair, of which it might, with equal propriety, be considered a branch.

The nerves analogous to the eighth pair arise from the side of the medulla oblongata, and the back part of the posterior lateral tubercles of the cerebrum, when these exist. There is no nerve analogous to the ninth pair, or hypothalamic nerves in fishes; although Ebel has figured a large nucleus in the carp, (cyprinus carpio), which he describes as the ninth pair. Much confusion exists amongst authors on this subject; thus Ebel confounds the eighth with the ninth pair; Monroe calls the olfactory tubercles the anterior prominences of the brain; and describes the sixth for the fifth pair of nerves; Scarpa delineates the hemisphere of the cerebrum under the name of the « foided prominences » of the brain. See Monroe's Physiologif of Fishes. Anatomie D'inhaltions de Aninu & Olufat, by Scarpa, and Observations Neurologiques on Aquat. comparantes, by Jo. Godof. Ebel.

The brain of fishes has been hitherto but little studied in its physiological point of view. Its structure is in this clafs of animals, however, promises to illustrate the functions of the different parts of the organ, as they are so distinct, that their proportional magnitude and importance may be fairly ap-

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their organ of sense, under the immediate impulse of which their actions are directed; and that they have little capacity for combining or associating their sensations; a conclusion which exactly accords with what has been observed respecting the habits and manners of this class of animals. We believe, if the same rule for judging of the mental faculties be extended to other animals, that it will answer equally well; and that the fallacious powers will be found proportioned to the relative magnitude, and the distinctness of the parts of the brain which give origin to the senses; and that the intellectual faculties will keep pace with the development of those parts which serve to unite the preceding. It is possible that this rule may be employed, to calculate the comparative excellence of the fallacious, and intellectual faculties of individuals in the same species. Perhaps even by these means some steps may be made towards ascertaining the shades and varieties in the mental character of men.

The hypothetic connection of the different parts of the system, doubtless depends upon the union of the nerves in the common lefthorium, which being imperfect in fishes, it became necessary that their optic nerves should be contributed to the sides opposite to their origin, on account of the organs of vision acting confeniently, or in harmony, with each other.

In Plate VI. of the Anatomy of Fishes, fig. 1, exhibits the upper surface of the brain of a fish (Cyprinus carpio); a, the olfactory tubercles; b, b, the two hemispheres of the brain; c, the cerebellum; d, d, the two lateral tubercles placed behind the cerebellum, analogous to the corpora olivaria; e, the simplex tubercle behind the cerebellum; f, the medulla oblongata.

Fig. 2. shows the brain of the carp, in which the hemispheres of the brain are cut, and turned to each side, in order to bring into view the anterior tubercles which fill the lateral ventricles, and which are fupposed analogous to the niter; g, indicates the tubercles in question, the other letters indicate the same parts as in the preceding figure.

Fig. 3. is the same brain, with the nates separated at their posterior part, in order to expose the posterior tubercles, or those corresponding to the tubercle of the niter; b, b, are these parts; the references of the other figures are the same as in the first figure.

Fig. 4. is another view of the same brain; the nates and tubercles, or tubera quadriruga, are raised to show the corpora striata, and the opening into the other ventricle, &c. h, h, exhibit the striated backs; i, the figure which leads into the inferior ventricle; k, k, the thalamus nervorum opticonis, which are fearcely visible. The other letter, have the same figurative as in the preceding figures.

Fig. 5. is still the same brain, with the hemispheres removed, in order to expose completely the thalami n versus opticonis, which are designated by the letters f, k.

Fig. 6. shows the brain of the carp, with the cerebellum divided and turned towards each side, to expose the fourth ventricle; the references are continued the same.

Fig. 7. is the brain of the carp, viewed upon its under surface. The parts seen in that position, which have been already represented in the other figures, are indicated by the same letters. The nerves are numbered according to the names they usually bear, as the 1st pair, or olfactory; the 2d, or optic, and so on; the decussation of the optic nerves is pointed out by the letter m.

Fig. 8. is a representation of the upper surface of the brain in the cell (murina angusta). The letters a, a, a, a, a, a, designate the six olfactory tubercles; b, b, the two hemispheres of the brain, which are not larger than the posterior olfactory tubercles; c, the cerebellum; d, the medulla oblongata.

Fig. 9. exhibits the inferior surface of the brain of the cell (murina angusta), the other letters correspond with those of fig. 8. In both these figures the nerves are indicated by their numbers.

In Plate VII. of the Anatomy of Fishes, fig. 1, is a view of the head of the thrush-back (fregusus domesticus), dissected to expose the brain and organs of sense: a is the large medullary mass formed by the olfactory tubercles; b, b, the two hemispheres of the cerebrum, called by Linn. olivar-desubercum of the brain; c, the cerebellum depressed along the middle, but not divided into two lobes; d, a portion of the brain, which must be considered either as a division of the cerebrum, or the middle posterior tubercle; e, e, the lateral posterior tubercles; f, medulla spinalis. Where the nerves are seen in this figure, they are expressed by their number.

In the dissected head of the fish (fregusus lucius), shown by fig. 1. in Plate VIII. of the Anatomy of Fishes, a, a, indicate the two principal olfactory tubercles; b, b, two inconsiderable enlargements of the root of the olfactory nerves, which might be considered as larger tubercles; c, c, the two hemispheres of the cerebrum; d, the cerebellum. In this figure, likewise, such nerves as are seen to arise from the brain are expressed by their numbers.

In fig. 4. of Plate VIII. of the Anatomy of Fishes, the olfactory tubercles of the carp (Cyprinus carpio) are shown: a, the cerebrum; b, b, the olfactory tubercles; c, c, the origin of the olfactory nerves by filaments; d, d, the trunks of the olfactory nerves. The other nerves that appear are indicated by corresponding numbers.

Nerves.

The course and distribution of the first or olfactory pair of nerves are pointed out in the description of the organ of smelling.

The termination of the optic nerve is described in that part of the article which treats of the eye of fishes. The component filament of the optic nerve are particularly evident in this class of animals, and may be demonstrated without any preparation. They are commonly flat; and Cuvier describes them as being sometimes formed of a very thin medullary lamina, folded on itself, and attached into the figure of a cord. This is particularly observable in the cell (madia morio), and the fregusus shopus (sphecus).

The third, fourth, and fifth pairs of nerves in fishes differ so little, with respect to their distribution, from the same nerves in other animals, that they do not require to be described.

The fifth pair of nerves, as before-mentioned, arise by a common trunk with the auditory nerve. In the fregusus (ranga batis) they form two trunks in the cranium, and appear to coalesce in passing out. On the outside of the cranial there are again two nerves produced: the one is the ophthalmanie; the other passes under the cartilage behind the orbit, and immediately divides into three branches: one of these is a nerve which has not been hitherto accurately described; the other branches correspond to the superior and inferior maxillary nerves.

The ophthalmanie branch of the fifth pair passes out of the cranium into the superior part of the orbit, and then divides into two branches; of which one proceeds across the orbit, under the rectus superior and externus, and the external oblique muscles of the eye; the other crooks above all the parts in the orbit. These two branches, on arriving at the nasal cavities, unite to form a single nerve. Previous to this reunion, the superior branch of the ophthalmanie gives off a branch to the organ of smelling. This forms an anatomic.
tomus with another branch, which is sent off from the conjoined nerves of the ophthalmic.

After passing beyond the nasal cavity, the ophthalmic breaks into a long saccus, from the sides of which a great number of short branches arise, which are lost in the gelatinous substance that is on each side of the middle cartilage of the front, and upon the edge of that cartilage.

The remarkable anastomosis of the ophthalmic nerve, and its distribution in the front, is represented in Plate VII. of the Anatomy of Fishes, and fig. 1, shows the origin of the ophthalmic from the fifth pair; r, the superior branch passing over the muscles of the eye; t, the inferior branch going between the muscles of the eye; u, the coalition of these two; v, the first branch sent to the organ of smelling; w, the second branch given off from the united nerve; x, the anastomosis of these branches; y, the distribution of the ophthalmic nerve in the front. This plate exhibits the parts as they appear in the thrushback (roja elevata), in which they do not differ materially from the description we have given of them in the flat (roja batia).

The branch of the fifth pair of nerves, which we mentioned as not being accurately described by other anatomists, proceeds in a straight line from its origin, under all the parts of the orbit, to reach the transverse cartilage, situated on the external side of the organ of smelling. As it penetrates this cartilage, one part of the nerve forms a sort of bulb or ganglion, from which a number of fine filaments depart like rays; these are abruptly, and almost immediately, lost in the membranous structure which forms the centres of the albuminous-gelatinous ducts, to be hereafter described. The other portion of the nerve is distributed in long branches to the same gelatinous substance of the front. This branch of the fifth pair is the most remarkable in the fifth pair's body, on account of its giving the only example of a gangliform enlargement of a nerve, (those of the organs of sense excepted) and from the peculiar mode of its termination. It is difficult to determine whether the singular conformation of this nerve be designed to betell a more delicate sense of touch on the fin, or to produce, with the albuminous-gelatinous ducts, an electric apparatus similar to what exists in the tortoise, &c. The latter, from analogy of structure, is very probable; although the electric property, if it exist in the ray kind generally, has not yet been detected by its effects.

The inferior maxillary nerve of the flat (roja batia) goes forwards under the orbit, and sends off several small branches, which penetrate and are lost in the operculum of the nasal cavity, and the integuments before the upper jaw; it then runs round the external part of the upper jaw, concealed by the large muscles which surround the ends of the jaws, and divides into several branches, which are distributed to these muscles. One of these branches goes on to be expended upon the integuments of the lower jaw.

The facial nerve, or that which corresponds to the portio oculi of the seventh pair, is much larger in the cartilaginous than the bony fishes. It forms two branches soon after its origin: one of these ascends in the cranial cavity, through which it passes, and is lost upon the integuments.

The other branch goes through a particular foramen, into the cavity of the ear, passes beneath the principal cartilaginous body, and there forms the remarkable anastomosis with the auditory nerve, from which the ampulla of the posterior semicircular canal is supplied. The trunk afterwards penetrate the cranium, and re-appears upon the external part, where it is lost in a number of branches in the bony parts and integuments of the head.

The auditory nerve of the fifth pair in fishes is analogous to the portio maxillaris of the fourth pair in other animals; and, like it, is distributed exclusively to the interior of the organ of hearing. It is described and figured in that part of the article where the ear is treated of.

The eighth pair of nerves in fishes differ materially from the same nerves in other animals, with respect to their course and ramifications. This depends upon the situation and structure of the parts they supply, in order to preserve an analogy with the nerves of this name in the other classes of animals. The first and most important branches are sent to the branches: these may be considered as supplying the place of the par vagum of mammalia. They are situated most anteriorly, and are usually four on each side; they separate from each other immediately upon leaving the cranium, and proceed to the branch x. When they approach these, each branch divides into two; one of which runs to the groove situated on the convex edge of the cartilages or bones that bear the branch, and feeds off numerous filaments to the lamina of the gill; the other branch passes in the corresponding groove of the cartilage of the branchial cartilages or bones, and is distributed in a similar manner. The anterior branch of the first branchial nerve, however, returns into the cranium, in order to be distributed to the ear.

The second branches of the eighth pair most commonly come out of the cranium as two or three distinct nerves, but sometimes they are furnished from the same trunk, as the last branchial. One of these nerves is lost upon the branchial muscles. The second, which is larger, is distributed to the side of the oesophagus, as far as the stomach. The third branch is conjuncted with the cervical nerves that go to supply the pectoral fin.

The last branch of the eighth pair has a very remarkable distribution; it is situated posteriorly to the others, at its origin; it proceeds almost directly outwards, and backwards towards the integuments of the side of the body, immediately after which it runs as far as the tail, when it terminates in fine filaments, upon the rays of the caudal fin. This singular nerve is nearly of the same size throughout its whole length; it has no palpable communication with the intervertebral or other nerves; and its course corresponds to the lateral line on the side of the body. It bears a greater analogy, perhaps, to the nerves accessorius than to any other, although its termination is much more remote.

According to Cuvier, the eighth pair of nerves in the eel (Anguilla) consists of a single trunk, which does not divide until it reaches the parts to which it is distributed. In these fishes the long lateral nerves are situated nearer to each other, and more towards the back.

The gill-pharyngeal nerves, as before mentioned, do not exist in fishes.

The cervical vertebrae cannot always be distinguished from...
from the dorsoal. Cuvier affirms that there are never more than four spinal nerves, which deserve to be called centralis; and frequently there are none to which this name can be applied. The first nerves of the spine, however, furnish those of the pseudaral member in fish of the same species, as will be hereafter described, and likewise a nerve which is distributed to the epiphysis, which divides the bony part of the spine; and which, therefore, may be considered analogous to the phrenic nerve of other animals.

The dorsoal, lumbar, sacral, and caudal, nerves of fishes resemble each other in their course and distribution, with the exception of those which supply the pseudaral and the dorsal rami of the rays; generally all the spinal nerves pass out of the vertebral canal, and are immediately distributed to the muscles and integuments adjoining. The nerves of the spine analogous with the great sympathetic, but do not produce a series of ganglia, as in other animals.

The intercostal, or great sympathetic nerve, comes out of the cranium, by the canal of the first vertebra; it is but a small filament extended along each side of the spine, without any tendinous enlargements or ganglia. It distributes branches round the principal arteries of the viscera, which supply the place of the different pleuric nerves of mammals.

The brachial nerves, or those which supply the pseudaral fins of fishes, are furnished by the two first vertebral nerves. The anterior of these is situated so near the eighth pair in some fishes, that it might be mistaken for a branch of the latter; it passes out, however, through a foramen peculiar to itself. The second vertebral nerve lies more behind the cephalus, and more towards the middle line of the body. These two nerves proceed directly to the internal lamina of the cephalus, where they are conjoined without being intermixed. The first vertebral then forms two branches, which send off filaments that anastomose with each other, and are distributed to the adductor muscles of the fin. One of the branches of the first vertebral nerve is sent to the hepatic ganglion of the brachial and abdominal cavities. This filament is considered by Cuvier as analogous to the phrenic nerve.

The two cords, formed by the vertebral nerves, pass through the hole situated before, and on the outer side of the articulation of the fin with the shoulder, where they unite and produce an irri radication of nervous filaments, several of which are lost in the external surface of the body. These two nerves proceed directly to the internal lamina of the cephalus, where they are conjoined without being intermixed. The first vertebral then forms two branches, which send off filaments that anastomose with each other, and are distributed to the adductor muscles of the fin. One of these filaments runs under the skin that covers the rays of the fin.

The brachial nerves are remarkably large, and are formed of a great number of nerves, from the spinal marrow in the flat cartilaginous fishes (genus raja). There is first a thick cord produced by the union of twenty vertebral nerves. This cord passes through the middle of the cartilaginous bar upon which the rays of the wing or great pseudaral fin of these fishes are articulated; it then proceeds forwards along this cartilaginous bar, and sends off a number of branches which run outwards along the rays of the anterior part of the fin, supplying the muscles placed between these rays, and the integuments, as far as the external edge of the fin.

A second cord is thus formed by the four or five next vertebral nerves, which divides at the roots of the rays of the middle part of the fin into four or eight filaments; these are distributed in the same manner as the branches of the first cord.

Afterwards each two vertebral nerves, as far as the forty-fourth, are united into cords, which penetrate the cartilaginous bar, and supply the posterior portion of the fin.

These different cords, which result from the junction of the vertebral nerves, may be considered as representing the brachialplexus of other animals.

The pelvic nerves, or those which supply the pseudaral fin of the flat cartilaginous fishes, are disposed in the same manner as those of the pseudoaral fin. Four or five vertebral nerves unite to form a single cord, which penetrate the cartilage that forms the rays of the fin, and is expanded in filaments, in the muscles of the fin. There are usually four more vertebral nerves sent to the posterior part of the pseudaral fin, upon which they are distributed in the same manner as the preceding cord.

The nerves of the pseudaral fin in fishes are filaments of the vertebral nerves, which are distributed to the intercostal spines. These filaments supply the muscles of the rays, and may be traced upon the skin to the edge of the fin.

The nerves of fish are distinguished from those of other animals by the want of ganglia, and their great magnitude in proportion to the bulk of the brain, and of the whole body. Monroe has described the coats of the nerves of fishes also as being covered by a number of spheroidal bodies.

Organs of Touch.

Fish are provided with any members capable of encompasing external bodies, and consequently possess the sense of touch in but an imperfect degree. The only parts in which any peculiar feeling appears to reside, are the cirri, the tentacula, and the extremity of the fist.

The cirri are situated upon the lips or about the mouth; they are commonly pointed taper processes, which in some instances appear to be composed chiefly by the common integuments; in the cod (gadus morhua), however, there is a very firm cartilage, and perhaps the same in other species.

These parts are not better supplied with blood vessels or nerves than the adjacent parts, and their surface is smooth and without papilla; from which circumstance it is probable, that they do not enjoy any peculiar feeling or sense of touch except what they derive from their form and prominent situation. Cuvier mentions only one process of this kind in the genus gula, in which he differs from other naturalists, who allow to some species three, four, and five cirri. There are two long cirri in the Calamus (Mullus). In the gudgeon (Cypinus gula) there are two, in the carp (Cypinus carpio) there are four short cirri, and in the barbel (Cypinus barbus) there are four, two from the sides of the mouth, and two from the summit of the head.

There are several cirri in the pogge or armed bull-head, (Cottus cataphractus) which appear like a beard, there are six or eight in the genera catus and silurus; in the latter two are placed before the eyes, like the antennae of insects, and four project from the under lip, which the animal is said to catch every year.

The cirri are numerous around the mouth in the frog-fish, (Iphitus pteractinus), and the gadaus taru.

The tentacula appear better calculated than the cirri, from their figure, for receiving the impressions of external bodies. In the gallargus and crested bream there are two tentacula on the top of the head, which form tufts, or are fimbriated at the end.

The tentacula are most remarkable in the genus Iphitus; the
the anterior tentacularum of the _lophius hispidus_ is divided at the extremity into two branches, the ends of which terminate in feathery filaments; the other tentacular are very long and conical, and end in filaments.

The _lophius piceatorius_ has some long tentacles on the head, which it has the power of moving in different directions. It is supposed by some naturalists, that it employs these tentacles in angling for its prey, and hence it derives the specific name _piceatorius_.

The principal part of the fene of touch appears to be the end of the snout; the sensibility of this part, however, does not depend upon any peculiar organization of its surface, but arises entirely from being largely supplied with nerves.

The ophthalmic branch of the fifth pair of nerves in the _thornback and skate_, after distributing branches to other parts in its course, as already described, runs along the edge of the cartilage which forms the middle of the snout, and sends off a great number of short filaments which are lost upon this cartilage, and the gelatinous substance on the edge of it, as far as the very point of the snout, where these nerves terminate in some fine filibrils; the last branch of the _superior maxillary nerve_ of the fifth pair exhibits, in fishes, a similar distribution along the edges of the cartilage inferiorly.

According to Cuvier, the ophthalmic and superior maxillary nerves terminate in small branches, which are sent to the hooks of the snout in the _jouq-fish_ (_anguila pristis_), and in the spines or tubercles of the snout in the ray genus.

In the _liver dog-fish_ (_anguila catulus_) the ophthalmic nerve goes on to the end of the snout, where it terminates in several short branches.

In _offious fishes_ the snout is also supplied in a similar manner by a large nerve.

The above account shews, that the snout of fishes strongly resembles the bill of birds, as far as regards its sensibility and its functions as an organ of touch; through its means the animal will be adverted of the approach of any foreign body, but it is by no means calculated to take cognizance of the qualities of substances applied to it.

In Plate VII. of the Anatomy of Fishes, fig. 1. exhibits the distribution of the ophthalmic nerve in the _thornback (aja elevata)_; _x_ indicates the origin of the nerve, _y_ its ramification in the snout; _z_ indicates the point of termination of the nerve.

Fig. 5. of Plate VIII. shows the ophthalmic nerve as it appears in the _pike_ (ipse lucius); _f_ is the nerve passing to the snout; _g_ is an artery derived from the internal carotid, which accompanies it.

In Plate IX. of the Anatomy of Fishes, fig. 2. exhibits the external part of the snout of the _frog-fish_ (_lophius piceatorius_); _e_ is the nerve passing to the snout; _s_ and _c_ numerous branched cirri around the lower jaw; _d_ is a long tentacular from the front of the snout, with which this fish is supplied to angle.

**Integuments.**

Fishes are covered by skin like other animals, in addition to which they have a peculiar integument formed by the scales.

Although fishes inhabit the same element as the _estuaries_, they are not provided with a subcutaneous layer of fat. This seems to arise from the hardpan of their animal heat approaching so near the temperature of the water, that they do not feel in need of defence against the latter. It is to be observed, however, that some fishes have a considerable quantity of oil diffused amongst their muscular and under the integuments, examples of which are found in the genera _anguilla_ and _salmo_, &c.

The only fish which appears to have really an integument is the _moon-fish_ (_tetrodon mola_). There is spread under the skin of this species a layer of a fattylooking substance, of about two inches in thickness. Upon examination this matter is found, however, to possess all the chemical properties of albumen. The use of such a covering on this fish is not understood.

It cannot be properly said that fishes possess a _panniculus cornaceous_, or _muscular integument_ in many species the skin adheres to the muscles of the body, which serving, in some places, to be infibulated into it; by this connection the skin may exactly comply with the motions of the body, but we doubt whether any fish is capable of moving the skin differently or independently of the body. Cuvier describes a subcutaneous layer of muscular fibres in the _carp_ (_cyprinus carpio_), and some other fishes with large scales. It adheres to the inner surface of the skin, and is divided into two portions by a longitudinal line corresponding to the situation of the vertebral column. At this place there are impressions made by the tendons infibulated into the skin. They describe curves, the convexity of which is towards the tail. These muscular fibres seem to perform the office of confining the skin, and thus regulating, in a degree, the position of the scales.

The _skin_ of fishes consists, as in mammals, of the _cutis_, or _true skin_; the _colouring substance_, or _rete mucosum_; and the _inflexible integument or epidermis_.

The _cutis_ seems to possess essentially the same structure in fishes as in mammals, but more particularly resembles the cutis of _lizards_ and _serpents_.

The _skin_ adheres very firmly to the external surface of the muscles by means of a web of _aponereutic fibres_, which appear in some species, as the _sole_ (_pleuronectes foles_), the _common eel_ (_murena anguilla_), &c. as a complete integument. The skin, or the _aponereutic fibres_ under it, adhere to the muscles chiefly at the parts where the latter are divided into longitudinal scales; the middle portions of these scales are at liberty, and lie enclosed by this means in a sort of sheath.

The skin appears to vary in thicknesses according to the strength of the scales; it is very thick in the _ray_ and _stark_ genera, the _eels_ (_murena_), &c. and thin in those species which possess large scales, as the _carp_ and _bream_ (_cyprinus carpio_ and _e. brama_), hence in preparing these fishes for the table, the former are deprived of their skin, and the latter of some scales.

The _rete mucosum_ is very palpable in this class. It adheres to the surface of the scales, and produces all those brilliant colours, and varying metallic tints, for which the bodies of fishes are so remarkable. It possesses, in general, considerable firmness; and in some instances has a smooth membranous appearance, which, however, we believe does not depend upon a fibrous texture, but the compression of the mucous pigment.

The whole of the external surface of fishes is covered by a soft mucous coat, which corresponds to the _epidermis_; it forms a thicker layer in the fishes that have smooth skins, than in those with large scales. The epidermis is so soft and pulpy that it does not deflect the name of a membrane; it is very easily rubbed off the skin, and is also spontaneously shed; in both cases, however, it is speedily removed.

The surface of the skin of fishes is more or less smears with a flimsy substance of a peculiar nature. The apparatus by which it is secreted is one of the most curious parts of the anatomy of this class of animals. Beneath the integument there are a number of ducts, or tubes, which open by many orifices upon the skin, more particularly about the head, and those parts of the surface of the body which are the most exposed to friction. Their ducts are largest and most numerous in the _fishes_.
FISH.

Fish with soft skins, but we believe they exist in every species, even those with large scales, and with obvious integuments. They are most remarkable in the *scomb* and *ray* genera, in which they have an arrangement, not the same as in the offens fishes.

In the *fisheis* (rig-split) there is, on the outside of the branchial apparatus, a duct under the skin, about the thickness of a crown's quill, which is called or reflected in a waving line towards the head; one extremity of it is flint, and ends at the anterior edge of the head; the other passes round to the upper surface of the head, where it finds off upwards of thirty smaller ducts, that terminate by open ends upon the skin; other branches are expended upon the inferior surface of the front, dividing and uniting to form several curves and zig zags, without being materially diminished in their diameter; from one of which a large duct goes to the upper part of the front. There are not, according to Monroe, above six or eight ducts on the inferior surface of the fish's body.

On each side of the fish, a little farther forward than the foremost of the five breathing holes, there is a central part, from which several feebly, composed of a great number of ducts of a subordinate order or magnitude, go off in different directions, to open upon the greater part of the surface of the body. These centres present the appearance of an irradiation of opens osseous cells. A very considerable branch of the fifth pair of nerves, already described, after forming an enlargement, reflecting a giration, is injected into in fins, and finally lost in filaments upon the parietes of this structure, with which they become fo inextricably united, that it is impossible any longer to distinguish them. Monroe supposes that the nerves disappear in consequence of changing their structure, but it should rather be said that they become imperceptible by abruptly terminating; for how can they be called nerves after they cease to possess the characters of such? This affords the most striking example of the sudden termination of a nerve with which we are acquainted in the whole animal economy, and illustrates what we have observed elsewhere with respect to the nerves that go to the pimpls of feathers and bulbs of hairs, &c.

In the *scomb*, the principal subcutaneous ducts about the head are too large, that they would admit a goose's quill. In the *topa* (fjvalus gatus), according to Cuvier, there is but one centre of communication for the ducts, which is situated in the snout.

In the *offices* fishes the ducts are less numerous than in the *chondripterygiis*, they are likewise provided with centres of communication. The principal ducts are situated upon the sides of the head, or over the jaws; where they send off several short ducts to terminate upon the surface. The ducts of each side communicate with one another on the top of the head, and with one which extends along the side of the body parallel to the lateral absorbing vellum.

The pores by which the ducts open upon the skin of the head are very visible in the common *pike* (fisca lutia), and the *sea pike* (fisca Borne). Cuvier states them to be more distinct upon the head of the *chumera monstroso* than in any other fish.

The subcutaneous contained in the subcutaneous ducts of fishes has not yet been strictly analyzed as far as we are informed. It is a fluid transparent jelly. It resembles very much the matter found in the cells of the electric organs of fishes, and that which surrounds the ova of frogs. It appears to be a combination of albumen and gelatine, in which the proportion of the former is so great, that instead of being dissolved by water it is slightly coagulated, by coming into contact with it: we have submitted it to the action of tannin, with which it combines like common gelatine. It however refurns in no respect mucus; therefore, Dr. Monroe very improperly calls the tubes containing it, *muces deut*. See his *Physiology of Fishes*.

There can be no question, both from the parts of the body upon which this gelatinous substanee is principally shed, and its being most abundant in those species which are not protected by hard integuments, that it is a defensive secretion against the continual friction and washing of the water to which fishes are exposed. Cuvier however, and other anatomists, are disposed to think that the subcutaneous ducts are in a degree analogous to the electric organs of fishes, which opinion is rendered not improbable from the great size and singular termination of the nerve sent exclusively to the centres of the ducts in the *ray* kind. Perhaps delicate experiments might detect a degree of this electric property in all fishes; if so, this faculty will answer other purposes in their economy than to prevent them from the attacks of the larger species of their own kind. We do not pretend to decide upon these questions, which can only be determined by more investigations, that have yet been made upon the subject.

The distribution of the albumino-gelatinous ducts is represented in Plate X. and XI. of the *Anatomy of Fishes*. In Plate X. the upper surface of a *fisheis* (rig-split) is shewn; a. the centre of the ducts on the left side; b. fasciculus of ducts going towards the spine; c. e, other fasciculi sent to the anterior parts of the fish; d, d, fasciculi proceeding to terminate upon the outer and back part of the great fins; e, a long fasciculus running backwards to terminate near the tail; f, a large branch of the fifth pair of nerves passing outwards from the cranium; g. its singular termination on the common centre of the ducts of the right side; i j k l, the beginning of the large duct of the under surface of the front; m, the same duct seen through the snout; n, the duct which is reflected from the anterior surface of the front; r, s, t, several branches of this duct which open upon the skin, on the side of the front. Fig. 1. of Plate XI. exhibits the anterior quarter of the under surface of the *fisheis* (rig-split); a. the large peritoneal duct reflected upon itself on the external side of the branchial apertures; b, e, branches of the peritoneal duct that open upon the inferior surface of the body; e, c, other branches that surround the nasal cavity; d d, analogous with the duct of the opposite side; e, the point from which a large branch is sent to the upper part of the front; f, the extremity of the peritoneal duct which turns round to the upper surface of the fish; g, the bind extremity of the peritoneal duct; b, b, parts of the corresponding ducts of the opposite side of the fish; i, the centre of the ducts on one side; k k k k k, fasciculi going off from the centre in different directions to open upon the under surface of the body of the fish.

Fig. 2. of Plate XI. is a lateral view of the head and part of the body of the cod, (gadus morhua); a is the anterior portion of an albumino-gelatinous duct, which runs upon the side of the fish, and has numerous short branches terminating by open mouths on the surface; b, the superior branch of this duct, which unites with the corresponding one of the other side, upon the top of the head, as seen at c, and terminates in a blind extremity on the end of the front, as indicated by d; e, shows the inferior branch of the lateral duct, running along the upper part of the body; f f j k, branches opening upon the skin; g is another large duct lying on the lower jaw, which has no communication with the others; h, j, k, &c. are the short branches it sends off to terminate upon the surface.
The integument which furnishes the most effectual defence to fishes is produced by the scales, and the other ossous pieces, which grow on their skin. For the description of these parts, see the article Scales, in this dictionary.

Organ of Smelling.

The apparatus for receiving the sensation excited by odorous substances is more complicated in fishes than other animals, although the organs are less offensive.

The nasal cavity, except rarely, as in the frig. (Lophius pescatorius,) does not form any external projection; the organ of smelling, therefore, from not striking the eye, received little attention from anatomists, and no full or accurate description of it was given before the publication of Scarpa's book De Auditu & Olfacto; it was even formerly mistaken for the organ of hearing; and Blumenbach says, this absurd opinion has been revived in modern times, but we are unacquainted with any anatomist at present who entertains such an opinion.

In the chondropterygian fishes the organ of smelling is situated on the under surface of the fount; but in the ossous fishes on the upper and fore part of it; it is contained in an oval or round shallow cavity, which in the ray and sharks, and in some ossous fishes, as the gurnard, &c. is formed by an excavation of the cartilage or bones of the head, but in most ossous fishes it is partly composed of bone, and partly of membrane.

The nasal cavity has no internal communication with the fauces, nor is it connected with any sinues or hollow parts in the bones of the face; in the chondropterygii, however, there is a groove or hollow, leading from the edge of the organ of smell, under the operculum, to the angle of the mouth.

The apertures of the nasal cavities, or external nares, of the genera raja and squalus, are in a great measure covered by an operculum, composed of two irregularly-formed cartilaginous flaps connected and covered by the common integuments. The operculum is elevated at the pleasure of the animal, according to Scarpa, by a number of fine mucular fibres which arise from the end and fore parts of the fount, proceed obliquely backwards towards the angle of the mouth, and are inserted into the operculum. The nare are closed by some fibres which act like a sphincter.

We confess we have not been able to discern either of these muscles, although we have examined very large fishes for the purpose. As the operculum is open or shut, the water flows in and out of the nasal cavity with more or less force, and thus the odorous matter is exposed to the surface of the organ.

In the ossous, and molt other fishes, the apertures of the nasal cavity are crooked by a flexible septum or bar; in some fishes this ligament is narrow like a cord; in others it is broader, and formed with irregular edges; each aperture is thus divided, so as to prevent the appearance of two nares on each side, an anterior and posterior; the former always continues open, and preserves the same figure, but the latter varies in size, in proportion as the cord is drawn outwards or resects into the cavity of the nose.

The septum of the nare is drawn outwards by a fasciculus of mucular fibres which arise from the bones of the fount, and is inserted into the middle of the septum. When this mucle is not in action, the clasticity of the parts, and the impulse of the water, are sufficient to depress the septum, and force it within the nares. Under these circumstances the posterior aperture is contracted into the figure of a chink. Some fishes, as the carp, (Cyprinus carpio,) have the power of elevating the septum so much, that the aperture of the nare is drawn out as a tube.

The frig. (Lophius pescatorius) has the nares, and indeed the whole nasal cavity of each side, elevated upon the top of the fount, in the shape of two drinking glasses, which are movable in every direction.

The external integuments are reflected into the nasal cavity; on arriving at the bottom of which they seem to form the pituitary or olfactory membrane.

The immediate organ of smelling consists in all fishes of a number of fine lamina, upon which the olfactory nerves are distributed. The varieties in its structure depend upon the different arrangement of the lamina, and the form and mode of ramification of the nerves.

In the ray kind (raja) there are two series or rows of lamina, separated from each other by a ligament which extends through the middle of the nasal cavity, from one end to the other. The laminae are round upon the superior edge, and false upon the inferior margin. They are broader in the middle of the cavity than towards each end of it, corresponding to its oval shape.

The surfaces of the laminae that are applied to each other furnish a number of thin narrow laminae, which are arranged in a radiated manner.

The disposition of the pituitary membrane is similar in the *fish* genus (squalus).

The other cartilaginous, and the ossous fishes have the internal laminae of the nasal cavity arranged in radii, around an elevated tubercle. In the *fishe* (osteochori florus), the laminae ramify or divide upon their free border into thinner plates. The carp (Cyprinus carpio), and some others, have the central tubercle approaching an oval figure, which gives the organ a good deal of the appearance it has in the *ray* and *shark*.

The pituitary membrane is abundantly beamed with mucous mucus, as is usual in other animals; the glands which secrete it are evident on the membrane of the ray and shark; it is generally covered with red vessels, and sometimes with black, as in the *pike* (Esox lucius).

The olfactory nerves, after arising from the brain in the manner already described, proceed a considerable way forwards, either in a canal left in the bones of the head for the purpose, or in the continued cavity of the cranium, as the case may be, during which course they usually acquire a greater size than when they left the brain.

After the olfactory nerves pass out of the cranium, and arrive at the organ of smelling in the ray, they become enlarged and softer in their texture, and proceed transversely outwards along the middle of the superior surface of the organ, included in a firm sheath, which is perforated by a number of foramina on each side; through each of these foramina a branch of the olfactory nerve passes, and soon after divides into a tuft or bunch of fibres, which are distributed in a beautiful manner upon the lamina already described.

In the *ray* (squalus galeus) the olfactory nerve is at first very slender, it passes out of the cavity of the cranium through a particular foramen, and soon after forms a round ganglion, in which two sheaths of nerves are produced: the main branches to the olfactory laminae on each side of the ligament which divides the organ into two portions.

The olfactory nerves of *ossous* fishes usually begin to divide into branches on approaching the back of the organ; these again divide into others, which are distributed in a very palatable manner upon the olfactory laminae.

The carp (Cyprinus carpio), the *fishe* (Squalus galeus), the *bad* dog (Gadus aestivalis), and the cod (Gadus morhua), have each of the olfactory nerves enlarged into a remarkable round ganglion.
ganglion just before they penetrate the back of the organ of smell; from this ganglion a bundle of branches go immediately to be dispersed upon the olfactory lamina. It is probable that ganglia also exist upon the olfactory nerves of the other species of *gadus, cyprinus, and flanus.*

It would seem, from the greater extent and sub-division of the olfactory membranes, that the ray and shark genera have a more acute sense of smelling than the eels. All this class of animals possess it in a high degree, which is shown by their nicety with respect to the different baits employed in catching them; thus, a worm, which has lost its flavour by maceration will be refused by a fish; but the same worm, having its smell revived by incisions made on it, will be taken greedily; we cannot, however, determine exactly the degree of excellence of the sense of smelling in fishes, as the medium through which they receive the impression of odorous matter is different from that by which it is applied to other animals; but we may suppose their perception of odorous substances to exceed that of mammalia, as the latter have no different sense to this, when diffused in water, and brought into contact with their organs of smelling in that state. The structure of these organs in fishes would also lead us to make the same conclusion; for the magnitude of the nerves of smelling and the surfaces upon which these nerves are spread, are proportionally greater in fishes than in any quadruped.

In fig. 10 of Plate VI of the Anatomy of Fishes, will be seen the external parts of the organ of smelling on the under surface of the front of the thornback, raja clavata; a, a, the opereculum, partially covering the nasal cavity, exhibiting a thin layer of muscular fibres running obliquely from before backwards; b, b, the ducts containing gelatinous matter, seen faintly through the muscular fibres of the operculum; c, c, the cartilaginous folds placed around the nasal cavity, and forming the interior part of the operculum; d, the conjuncture of the cartilaginous folds seen through the mucous membrane; e, e, the ligament of each side which divides the olfactory lamina; f, f, f, f, the membranous plates or lamina arranged on each side of the ligament and g, g, the hollow folds by which the nasal cavity communicates with the angles of the mouth.

Fig. 1. in Plate VII. of the Anatomy of Fishes, exhibits a diffused view of the upper part of the organs of smelling in the same fish; a, a, the olfactory nerves enlarged, previous to their entering the sheath; b, b, the bulbs of the olfactory nerves seen passing across the nasal cavity, the sheath being laid open on one side, and removed on the other, the branches that arise from the bulb are exposed; p, p, the superior or convex edges of the laminae covered with membrane; g, g, the ramifications of the olfactory nerve brought into view by removing the membrane on the back of the organ.

Fig. 5. in Plate VII. of the Anatomy of Fishes, is a transverse section of the organ of smelling in the thornback; a, the bulb of the olfactory nerve; b, b, the ligament which runs through the centre of the olfactory lamina; c, c, the membranous lamina of the second order that arises from the sides of the other.

Fig. 6. of the same plate, shews about the half of the organ of smelling in the thornback, magnified; a, a, the lamina; b, b, the lamina of either side; c, c, one of the nerves given off from the bulb; d, d, the ramifications of the nerve upon the duplicature of the olfactory membrane; e, e, the membranes of the second order.

Fig. 7. of the same plate, represents the distribution of the olfactory nerve in the tope, (salamis galeus); a, a, the olfactory lamina from above; b, the trunk of the olfactory nerve; c, c, the bulb or ganglion; d, the facial of nervous filaments; e, the division of these into two parts, indicated by f, f, g, g, the double series of branches of the olfactory nerve distributed to the two fins of laminae.

Fig. 1. of Plate VIII. of the Anatomy of Fishes, exhibits a diffused view of the olfactory nerves in the pike, (perca lucius); a, a, the olfactory nerves when they first begin to break into filaments; b, b, the filaments distributed to the bottom of the nasal cavity; c, c, the anterior aperture of the nares; d, d, the posterior aperture; e, e, the bar or bridge across the nares; f, f, the fifth pair of nerves sent to the organ of smelling for common sensation.

Fig. 3. of Plate VIII. shews the external parts of the organ of smelling in the pike; a, the posterior opening of the nasal cavity; b, the anterior openings; c, the bar or bridge between them; d, the olfactory nerves for elevating the bar or septum of the external opening of the nasal cavity; the bar being removed, the bottom of the nasal cavity is exposed, in which are seen the radiant membranes or laminae of the organ indicated by the letters c, c.

In fig. 4. of the same plate, the distribution of the olfactory nerves is exposed in the carp, (cyprinus carpio); d, d, the trunks of the olfactory nerves; e, e, the trunks becoming calcified or composed of filaments; f, f, the bulb of ganglion of the olfactory nerves; g, g, branches formed off from the ganglia, and distributed upon the olfactory membranes; h, h, foramen left on one side, through which the branches of the olfactory nerve pass to the organ of smelling.

The diffused head of the frog, *fis* (lorius piscatorius) in fig. 1. Plate IX. of the Anatomy of Fishes, exhibits the confluence and termination of the olfactory nerves; s, s, the olfactory nerve passing through the cranium; y, y, the olfactory nerve continued along a canal in the front; z, z, the nerve spreading into filaments, previous to its distribution upon the laminated structure of the organ, indicated by *.

The second figure of the same plate represents the external part of the front of the same fish; a, the organ of smelling as it appears elevated upon a tooth; b, the organ of the other side with a part of it cut out, to bring into view the olfactory laminae.

Organ of Taste.

There is every reason for denying the sense of taste to the tongue of fishes. This organ in them wants almost all the peculiarities of structure which fit it for receiving the impressions of rapid substances. The integuments are without papilae, and do not possess greater vascularity, or a larger supply of nerves, than the covering of the other parts of the mouth, and in many species the surface of the tongue is beated with teeth. The movements of the tongue of fishes are also limited to elevation, depression, and a very slight degree of lateral motion; it is incapable of flexion or extension, which are the actions mostly employed in tasting; the extent of surface the tongue affords is usually very inconsiderable in fishes, as this member projects but a little way into the cavity of the mouth; and in the *cladodentognath* there is no prominence of the palate of the interior part of the mouth to be discerned. Lastly, the whole surface of the mouth in fishes being besmeared with a thick tenacious mucous, must very much obscure the perception of rapid substances.

In the ray genus there are two flaps of the integuments upon the edge of the mouth, somewhat of a triangular shape, with the free border denticulated, or rather fringed. These parts appear to us better adapted for receiving the impressions of taste than the tongues of fishes.
FISH.

It is most probable, that the sense of taste is extremely imperfect, if it exists at all in this class of animals; indeed, it could seldom be called into action, as most fishes choose their food by the assistance of the senses of seeing and of smelling.

Organ of Hearing.

As sound is always conveyed to the ear of fishes through the medium of water, they do not require an external concha, or any projecting parts for collecting the resonant vibrations. The whole of the organ is, properly speaking, internal, or within the head, in these animals.

Anatomists disagree with respect to there being any meatus auditorius externus, or external opening leading to the interior of the organ. It is only contended for in the cartilaginous fishes with free branchiae. Both Monroe and Hunter assumed the merit of discovering this part. The former described it in the skate (raja bati) in these words: "In the back part of the occiput, near the joining of the head with the fin, two holes, not larger than a thimble, or a small pin, are found at the two ends of the series, from one another; in a large fish each of these leads into a capacious winding canal or concha, which describes nearly a complete circle; the two conchæ are separated from each other by a thin partition; each concha terminates in a funnel, from which a small cylindrical canal, or meatus auditorius externus, is continued; the meatus is lodged in a hollow left between two thick cartilages; and as there is no membrana tympani, it opens, he says, into a large sac, which contains a white or opaque matter, with a quantity of clear watery-looking, but viscous matter."

This sac is the part upon which the auditory nerve is spread, as will be afterwards described.

He further says, "that generally some portion of a similar white matter is found in the meatus auditorius externus and concha, as if part of it passed off by the meatus, or was somehow necessary for communicating the impression of sound to the bottom of the ear."

In another place Doctor Monroe conjectures this "meatus auditorius externus performs the office of the Eustachian tube, at least fo far that tube may be supposed to serve the purpose of discharging useless or hurtful matter."

Monroe's Physiology of Fishes, p. 48, 49.

Mr. Hunter does not give any particular description of the external opening of the ear in the ray or eel genera, but frequently mentions it as a part he had discovered, and notices a passage in Willoughby's History of Fishes, in which there is some account given of an external opening on the head of the skate, in the neighbourhood of what Willoughby supposed to be the organ of hearing in that fish.

The existence of any opening into the interior of the ear from the external part of the body has been denied by a number of highly respectable anatomists.

M. Geoffroy, who described the organ of hearing before either Mr. Hunter or Doctor Monroe, mentioned an external opening, which he states as being difficult to find; he says it is concealed by the muscles, and situated near the condyles at their lateral external part; and in another place, he speaks of the auditory foramen being covered with the muscles and the fat. This account is different from the one given by Monroe and Hunter, that it adds no confirmation to their opinion.

Camper positively denies an external opening to the ear of the skate. He says, "L'organe de l'ouie e la raye n'a donc aucune communication avec l'air de l'atmosphere; mais il eft enfermé," &c. Camper, Mem. de Math. tom. vi. p. 194.

Vicq d'Azyr entertained the same opinion; in speaking of the cartilaginous fishes with fixed branchiae, he says, "L'organe de l'ouie n'a point chez eux d'ouverture externe." Vicq d'Azyr, tom. 7, p. 20.

To these authorities we may add that of Scarpa, who afferts, in the most positive manner, that there is no external opening to the ear of either the flat or round cartilaginous fishes; he supposes, that the foramina which Doctor Monroe discovered were the openings of some of the ducts containing gelatine, which are found in this situation; he even treats Doctor Monroe's account with derision; and considers it absurd to suppose that there should be a communication between the external element and the immediate fæt of the sense of hearing.

Scarpa, in denying an external opening, admits the existence of a conduit from the integuments into the vestibulum or sac containing the amylaceous substance.

In this Cuvier agrees with him, and we may add, that we have frequently and carefully dissected the organ of hearing in the ray and eel genera, but have never been able to discover the openings mentioned by Monroe and Hunter. What we have observed agrees almost exactly with the description given by Scarpa.

Behind the occiput, where it is articulated with the first vertebra of the neck, the skin is smooth and a little deprefed; if it be raised at this place two oval membranes present themselves, one on each side. These are pellucid, but at the same time dense and inyielding; they adhere firmly to the edges of two foramina, from each of which a funnel-shaped duct leads directly into the vestibulum. Scarpa considers these foramina analogous to the fissure ovale; the membrane which covers them, however, has some of the properties of the membrana tympani, and may have some effect in regulating or increaing the impression of sound; we perceive then that the cavity of the labyrinth is perfectly closed at every point, as well in the eonsus as in the osseous fishes; indeed, a different structure would be a departure from the plan of the organ in all other animals.

The membraneous labyrinth in the cartilaginous fishes with fixed branchiae is situated in a corresponding excavation of the sides of the back part of the head; it is so much wider than the part it encloses that they would not prefer their places, but from their connection with vessels, nerves, and processes of cellular substance, which pass to them in different directions: the cartilaginous labyrinth has no communication with the cavity of the cranium, except through the foramina, for transmitting the nerves to the ear. It is composed of very transparent, and much fitter cartilage, than the other parts of the head.

In the fishes with free branchiae, whether cartilaginous or osseous, the greatest part of the membraneous labyrinth is continued in the sides of the same cavity which holds the brain; there are, however, some depressions on the inside of the cranium for receiving parts of the ear, and some portion of the semicircular canals is situated round the projecting columns of bone, or in short osseous canals.

According to Cuvier, the large lateral depression of the cranium in the moon fish (tetraodon nuda), containing the ear, is divided by only two small cartilaginous columns, one of which is horizontal, and furnishes a pulley to the posterior semi-circular canal; the other is vertical, and affords one to the horizontal canal; but as the interval between these columns and the parietes of the cranium is ten times greater than the diameter of the canals, they are suspended in that space by vessels and cellular substance. The anterior vertical canal has even no column of this kind, and there is no depression for the sac in the base of the cranium.
In the *frogfish* (*lophius piscatorius*) the cartilaginous columns are broader, and approach more to the parietes of the cranium, and form two pelves, through which the posterior and horizontal canals pass.

In the *offeous* fishes there are larger columns or divitions of the cavity of the ear than exist in the *branchiostegous* fishes, and the pelves are lengthened into short canals, which include a certain portion of the membranous semi-circular canals, more especially the posterior and horizontal ones.

The anterior semi-circular canal is sometimes uncovered. In the *pike* (*Esoc Lucius*), the *eel* (*muraena anguilla*), the *roach* (*cyprinus rutilus*), and the *mackerel* (*scomber scombrus*), there is only a small offeous pillar corresponding to the space within the anterior canal. In the *dory* (*neus fischer*) this canal reaps in a furrow. In the *cod* (*gadus morhua*), and the *carp* (*cyprinus carpio*), the anterior canal is partly enclosed in one of bone, and the posterior and horizontal canals are almost concealed in the bones of the cranium.

When the face which contains the ophidian is at a distance from the sinus, the depression which receives it is deep. The *cod* affords an example of this, but it is more remarkable in the *carp* and *bunting*.

In these fishes the cell for holding the face surrounds it, leaving an opening only for the narrow canal which joins the face and sinus together.

In every instance amongst the *offeous* fishes, in whatever way the face and canals may be inclined, the sinuses and extremities of the canals remain in the cavity of the cranium; the nerves therefore, in passing to the face, do not go through any foramina in the bones. But in the *flounder* (*acipenier flarius*) there is an approach to the structure described in the *cartilaginous* fishes with fixed branchiae; each of the canals is entirely enveloped in a tube, considerably larger however than the one it includes; the face lies close to the side of the cranium, from the common cavity of which it is separated by a very thick membrane, secured there by several ligamentous procurses. The nerves are transmitted through holes in this membrane left for that purpose.

The parts which immediately constitute the organ of hearing are essentially the same in all the orders of fishes; they consist of membranous semi-circular canals, and certain dilated parts or faces, which contain calcareous substances, either hard or soft, and upon which the nerves of hearing are chiefly spread; all these parts are further completely filled up with a gelatinous fluid, or transparent pulp.

The structure of the canals and face is nearly the same in all fishes, they are as thin as membrane, but transparent and elastic, like cartilage, of the nature of which they should probably be considered: when these parts are cut alounder, they do not collapse, but present open mouths, like the fection of an artery.

All fishes have a few with respect to the number and direction of the canals; they are always three, an anterior, posterior, and horizontal; the first is situated forwards, is inclined backwards, and stands nearly upright; the second is directed backwards and upwards, and its position is also nearly vertical; and the third makes its circuit outwards, and in a horizontal plane.

Each of these canals forms an *amphulla* or spherical dilatation at one of its extremities; the *amphulla* of the anterior canal is placed at its anterior or inferior extremity; that of the horizontal canal at its anterior extremity, therefore, near the preceding; the *amphulla* of the posterior canal is situated at the inferior extremity.

The anterior extremity of the posterior canal, and the posterior extremity of the anterior canal, form a junction before they terminate in the face. The other extremities of these canals, and both the extremities of the horizontal canal, have distinct terminations. There are therefore five openings from the three semi-circular canals.

As far as respects the form and distribution of the semi-circular canals, the organ of hearing in fishes will be perceived to resemble the membranous labyrinth in the higher classes of animals: the circumstance in which it most materially differs is the existence of the face containing the cartilaginous bodies.

In the *cartilaginous* fishes with fixed branchiae, the face is triangular in its form; the internal angle, or that next the brain, communicates with the duct leading from the fenestra ovalis. The part corresponding to the second angle is round or oval, and situated posteriorly. The third angle has an anterior and external direction.

In these fishes there are three calcareous mallei, a large or principal one; and two smaller, of which one is smaller than the other, and therefore they are called the *offe* and *shoof* bodies of this kind. The confidence of these substances is soft, resembling a mixture of plaster of Paris before it is used for making a cast more nearly than any other substance with which we are acquainted; they have been likened to a soft mixture of chalk, and to flax, and hence they are called the *retaceous* and *anaglyous* bodies. The large retaceous body has somewhat the figure of a bivalve shell; one side is convex, and the other a little concave, with a groove along its broadest margin; the latter retaceous body is triangular; and the leaf has the figure of a kidney bean, but is a vast deal smaller in shape.

These bodies are not allowed to float at liberty in the face; some of their surfaces are applied close to the membrane, and the others adhere to the gelatinous pulp, which is moulded to their shape, and they are further retained in their situation by the ramifications of the auditory nerves.

In the fishes with free branchiae, there is considerable variety in the structure of the dilated parts, for containing the cartilaginous bodies, and in the form of these bodies.

The face in the *moonfish* (*tetraodon mola*) is cone-shaped; the pointed end is turned towards the brain, and the base receives the semi-circular canals.

In the *flounder* (*acipenier flarius*) the face is a broad flat disk, placed in a vertical direction.

In these, the *frogfish* (*lophius piscatorius*), and as far as it has been observed in all the *cartilaginous* fishes with free branchiae, the face is an undivided cavity; but in the *offeous* fishes, the coalition of the extremities of the semi-circular canals produce an intermediate cavity between these and the face.

Scarpa calls this part *fitium utriculiformis*, or the bottle shaped *fitus*. It might with great propriety be considered as analogus to the membranous vestibulum of other animals, although considerably different in its shape. The *fitus* is usually elongated, and tubular in its appearance, and distinguished from the face by a contraction: it contains the third ossicleum or cartilaginous body.

The face of *offeous* fishes is generally oval in its figure, and placed on the lower surface of the cranium, so as frequently to approach the one of the opposite side; sometimes there is a hollow in the base of the cranium for its reception, as already-mentioned. Cuvier considers the face analogous to the cochlea, on account of there being a feptum formed within them by their internal membrane and contained parts.

In the *pike* (*esoc lucius*) there is a small oval cavity lying behind and below the *fitus*, to which it is connected by a small canal. This part has been called the *appendix* of the semicircular canals by Scarpa and others; but it should rather be called an additional face. It has not yet been observed.
in any other fish except the pike; but there is nothing peculiar in the general anatomy of this species, which would lead us to suppose that it is confined to it. The appendix receives a branch from the first spinal nerve.

Among the cartilaginous fishes with free branchiae, the Proteus (Hoplites pfefferianus) has three calcareous bodies: a large one and a small behind it are continued in the face; the third is very small, and is situated in the cavity formed by the junction of the anterior and horizontal semicircular canals, just below the ampulla of the foramen. It is triangular in its figure.

In the herring (Ammodytes parisii) there is only one calcareous body: it is triangular, and consists of a hard nucleus, which is partly surrounded by soft cartilaginous matter.

The substances found in the face of the moon fish (tetrondon molus) appear more like mucus than chalk.

Probably many more varieties would be discovered in the cartilaginous fishes with free branchiae, if their anatomy were better known.

In all the echeneid fishes there are three calcareous bodies, which have commonly been called officula: their composition is, however, different from that of any other bones; they are extremely hard, of a nearly white colour, and almost transparent in their thinner parts. They appear to consist of pure calcareous matter, without any mixture of animal substance, and more nearly resemble the enamel of the teeth than any other part of the officous sytem.

There are considerable varieties in the bulk and form of the officula, respecting which we are indebted to Cuvier for some details.

The principal officulum is usually placed obliquely in the face. It is commonly an oval figure in the genus gadus; it is nearly round, with an angle internally, in the genus vulgaris, and in the species of cyprinus that have been examined, as the carp (C. carpio), the common (C. communis), the tench (C. tinca), and the roach (C. rutulus). In the genus falcus, the pike (Esox lucius), and the herring (Ammodytes parisii), it is irregularly triangular.

The officulum is small in the el (murena anguilla), the star gazer (uranoscopus fexace), the flat fish (placodentii), the dog (zeus fexace), and the pike (Esox lucius); of a middle size in the herring (chuba barcaurus); and large in the genus gadus, particularly the cod, in the carp (Cyprinus carpio), and a number of the thoracic fishes.

The chief officulum is convex on one side, and concave on the other; the external surface is rough; the internal is smooth, except a furrow which appears to form, with a production of the internal membrane of the face, a small canal which passes through the interior of the face. This furrow is commonly longitudinal; sometimes it is shaped like a horse-shoe. In the carp (cyprinus carpio), it is nearly circular; in the cod (gadus morhua), its place is supplied by an elevated ridge.

The anterior end of the officulum has frequently some projections from it. There are two of them in the pike (Esox lucius), the mackerel (scromber scrombrus), and the herring (chuba barcaurus). The officulum of the carp (cyprinus carpio) has three; the one in the middle projects like a style. The end of this bone is round and without points in the genus gadus and vulgaris, the roach (cyprinus rutilus), &c.

Some flukes are almost always observed to extend transversely from the furrow to the edge of the principal officulum; these are intended to lodge the numerous fibriae of the auditory nerves. These impressions are particularly remarkable in the carp genus (cyprinus), in which they have a radiated appearance.

The second or middle fixed officulum is commonly inserted behind the large bone, but somewhat more externally: its most usual form is semicircular, the concave side being anterior. Its size varies, but it is always much less than the principal officulum. Its figure is peculiar in the carp, in which it resembles that of the head of a spear.

The third officulum, as already mentioned, is situated in the sinus utriculiformis: it is sometimes so near the principal bone, that it is apt to escape observation; its figure varies. In the genera gadus, scromber, &c., it is triangular; in the gurnard (trigla), it is lenticular; in the pike, it is rounded and unequal. It is larger proportionally in the carp than in any other genus, and its surface is scabrous, and the edge serrated.

By these hard or extraneous substances being placed in the gelatinous pulp, and in contact with the nerves, it is evident that the impressions of sound are conveyed to these parts: they thus compensate for the want of an organous labyrinth, which most probably in mammals and birds has the effect of rendering the concussion of sound more sensible. Camper has ingeniously observed, that to be convinced that a hard body floating in a gelatinous substance is affected by the slightest external motion, it is only necessary to introduce some hard body into a glans of jelly, when the motion of this body will be sensible to the fingers holding the glas, on shaking the jelly, or giving the glas a little shock with the finger of the other hand. He mentions another simple and illustrative experiment, which consists in putting some hard body into a bladder containing a fluid, the slightest motion of which will be communicated to the hard substance, by which a strong sensation will be excited in the finger holding the bladder.

Two nerves, which correspond to the portio dura and portio mollis of the seventh pair, are found in fishes. The latter has a peculiar origin, not being a distinct trunk, but conjointed at its root with the fifth pair of nerves, of which it is usually reputed a branch, although, with more propriety perhaps, the fifth pair should be considered a branch of the portio mollis.

In the cartilaginous fishes with fixed branchiae, the auditory branch, or portio mollis of the fifth pair, after passing through the foramen, which transmits it from the cavity of the cranium into that of the ear, bends round behind the external parietes of the vestibulum, and divides into two principal branches, one of which is vastly larger than the other. The latter branch is distributed in a reform manner upon the posterior surface of the face containing the smaller craticeous body, and tends off two longer branches, which proceed to the ampullae of the anterior and homidinal canals, in which they are expended. The nerve or principal auditory nerve forms a taceuculus, the filaments of which divide, subdivide, and re-unite upon the posterior surface of the face containing the large craticeous body, so as to produce an intricate and close plexus, from the posterior side of which a nerve goes off to be distributed upon the face of the smallest craticeous substance. A branch, also furnished from the posterior side of the plexus, coalesces with one belonging to the portio dura, which passes through a particular foramen from the cranium, and arrives behind the large lac. From this anatomical branch, which supplies the ampullae of the posterior semicircular canal, is given off. The nerve afterwards proceeds
proceeds to the external part of the head, and is distributed immediately under the integuments about the occiput, and the beginning of the neck.

The portio mollis in offiuous fishes, which also is a branch of the fifth pair of nerves, almost immediately divides into two branches, of which one goes to the ampulla of the anterior canal, and the other passes under the sinuses to the ampulla of the horizontal canal. The second branch of the portio mollis further gives off a longer branch, which goes to the posterior part of the head, behind the superior margin of the cavity for lodging the face, and divides into many filaments, which are dispersed in a net-work upon the portion of the face next the brain. From the upper and posterior part of this reticulation a nerve is joined by a branch of the portio dura, and proceeds to the ampulla of the posterior canal.

In the offiuous, therefore, as well as the cartilaginous fishes, the ampulla of the posterior semicircular canal is supplied by an anastomosis of the portio dura and mollis.

Dr. Monroe and Mr. Hunter thought that the auditory nerves did not pass through the parietes of the membranous labyrinth in fishes; but, after running a little way upon the surface of the face and canals, became pellucid and disfused; the distribution of these nerves is very differently described by Scarpa and Cuvier; for the former traced the branches into the ampulla of the semicircular canal, in which they become soft and pulp'y, and with the assistance of the membrane produce a septum which nearly interrupts the half of the cavity. Cuvier states that the nerves of the face penetrate into the interior of the cavity, and are distributed immediately upon the calcareous bodies contained therein. As we have not at present examined this matter, we quote the authorities. See Hunter in Phil. Trans. vol. lxxii. part 2. Monroe's Physiology of Fishes, p. 59. Scarpa de Auditu & Olfaetu, p. 15. Cuvier's Lectures on Comparative Anatomy, translated, vol. ii. p. 468 and 546.

Hunter and Monroe have made some experiments to determine the possibility of hearing under water, which were very unnecessary, as it was well known that fishes were sensible of sounds produced even in the air. In fact, sound is communicated with greater or less facility according to the density and elasticity of the medium through which it passes; consequently it will be more readily propagated through solid substances and water than through air, and hence we find the organ of hearing less complicated in these animals that receive impressions of sound from the earth or water, than in those that inhabit the air; the ear of flies is admirably constructed for receivinghonorous vibrations in a dense medium; the great extent and elasticity of the face and canals; the existence of calcareous bodies, more especially when they are hard, and the large plexus of nerves, all seem calculated for this purpose. If the ear of fishes were provided with a tympanum, it would probably be of no use, unless it were filled with some fluid as denser, at least, as water.

In Plate VII. of the Anatomy of Fishes, fig. 1, exhibits a view of the organs of hearing in the thornback (raja elevata) in situ; a, anterior semicircular canal; b, posterior semicircular canal; c, the ampulla of the horizontal canal; d, cavity of the vestibulum, which contains the large sac laid open; e, the cavity of the vestibulum and the cartilaginous tubes which enclose the membranous canals being laid open; f, the anterior semicircular canal; g, the posterior semicircular canal; h, the horizontal semicircular canal; i, the cavity of the vesti-"
other extremity of the same canal; &c., the ampulla of the posterior canal; b, the other extremity of the posterior canal; c, the utriculiform sinus of the semicircular canals; f, appendix peculiar to the pike; i, the smallest ocellus seen through the sinus; f, the facial containing the other two ocelli. No. 5 indicates the trunk of the fifth pair of nerves; m, the auditory nerves; n, the branch of the auditory nerve to the ampulla of the anterior canal; o, the branch of the auditory nerve to the ampulla of the horizontal canal; p, nerves derived from the auditory going behind the small ocellus; q, the branch of the auditory nerve sent to the ampulla of the posterior canal; r, auditory nerves distributed upon the face next the brain; s, nerve analogous to the par vagum or portio dura; t, the anastomosis of the preceding nerve, with a branch of the auditory or portio mollis, from which the ampulla of the posterior canal is supplied; u, a nervous filament sent from the first spinal nerve to the bottom of the appendix.

Fig. 4. of the same plate explains the different cavities of the bones of the cranium, in which parts of the labyrinth are enclosed: a, the cavity of the cranium; b, a hollow, in which the face of the skull is lodged; c, a fenestra for containing the ampulla of the anterior semi-circular canal; d, the aperture leading into the passage which holds the horizontal semi-circular canal; e, the common foramen to the horizontal and posterior canals; f, the other opening, through which the posterior semi-circular canal passes; g, the foramen, by which the portio dura goes out of the cranium; l, canal of the spine; i, i, foramina for the exit of the fifth pair of nerves; k, foramen for the first spinal nerve.

In Plate IX. of the Anatomy of Fishes, fig. 1, is a section of the head of the frog-fish (loubius piscatorius); a, the anterior semi-circular canal; b, its ampulla; c, the horizontal semi-circular canal; d, its ampulla; e, the posterior semi-circular canal; f, its ampulla; g, the conjunctive of the anterior and posterior semi-circular canals; h, a large canal, into which all the others open; i, principal face containing the large ocellus; k, the facciulus of the lesser ocellus; l, the third or smallest ocellus seen through the membrane below the ampulla of the anterior canal; m, the nerve going to the ampulla of the anterior canal; n, the nerve of the ampulla of the horizontal canal; o, nervous filaments sent behind the seat of the third ocellus; p, filaments of nerves distributed to the capsule of the large ocellus; q, a filament which goes to be expended upon the capsule of the lesser ocellus; r, a long nerve sent to the ampulla of the posterior semi-circular canal; s, the portion of the fifth pair of nerves that go out of the cranium; t, the fourth pair of nerves; u, the third pair of nerves; v, the second or optic nerves; x, the first or olfactory pair of nerves.

Organ of Vision.

The eyes of fishes are usually situated on the sides of the head, in which cases the animal only beholds objects with one eye at a time; some remarkable exceptions exist, however, with respect to the position of the eyes in this clafs: they are turned directly upwards in the flounder (urinaeus). All the genus pleuronectes have both eyes placed on one side of the head, which, from the position of the fifth ocellus, is always the uppermost. In the callionymus and the ray genus the eyes have an oblique aspect.

The figure of the eye in fishes usually approaches that of a semi-sphere, the flat surface of which belongs to the cornea. In the ray genus the eye is flat also laterally, and has, consequently, the form of a quarter of a sphere. Some fishes have the cornea gibbous, and the eye of the same figure that it possesses in these animals which inhabit the air; the gadus lota affords an example of this shaped eye.

The sclerotic coat is dense, elastic, and cartilaginous in its structure; and although sometimes thin, it preserves the figure of the eye. In some species, more particularly among the cartilaginous fishes, it is thick. This is remarkable the case in the sturgeon (acipenser fluvius); in this fish the sclerotic composes the greater portion of the eyeball, the cavity for containing the transparent parts bearing but a small proportion to the rest of the globe. This coat is thin in the posterior part of the eye of the salmon (salmo fluvius), and hard and unyielding as bone on the fore part. The induration of the front of the sclerotic is also found in several other species.

The sclerotic of the ray and shark genera forms a tubular projection at the back of the eye; this is articulated with a piece of cartilage which is connected at the other extremity to the bottom of the orbit. The eye in these animals, therefore, is sustained upon a footstalk, upon which it is movable only to a certain extent.

The cornea, as before mentioned, is commonly flat in fishes.

The definition between this coat and the sclerotic is particularly plain in the tope (gonialus galerus); these two coats are conjoined by oblique edges, between which is interposed a fine compact cellular substance, which appears to be a production of the conjunctiva that passes into the eye to be united to the corneal lamina.

The conjunctiva is reflected over the external part of the globe of the eye in fishes as in other animals. This is satisfactorily shown in the cod kind (murina), in which it adheres so tightly at this place, that it is removed in flilping the skin off the rest of the body.

The choroid coat, and memhrana ruyischiana, are very different from each other in this clafs.

In the genera raja and flusus the choroides possesses the usual vascular structure, and is of some thickness and confluence; the ruyischian membrane is very thin and transparent, and between the two membranes there is spread a silvery pigment.

But in other fishes the choroides is very thin and little vascular. It is a white silver or gold colour. The ruyischiana has more confluence, and is composed of an infinite number of vessels interwoven together. It is a black colour. There is interposed between these coats a remarkable body called the choroid gland, which is not found in the chondropterygi.

The choroid gland has usually the figure of a thick flat ring; it encircles the optic nerve, but not entirely, as there is always a small deficiency in the ring.

In the cod (gadus morhua), the salmon (salmo fluvius), and the moon-fish (tetraodon melo), it has been observed to form not a true circle, but to be irregularly bent; and in the perca labrax it is composed of two pieces placed on opposite sides of the optic nerve.

The choroid gland is very compact in its structure; it receives a multitude of fine vessels which pass through the membrane ruyischiana; they are covered by a white opaque mucous, anastomose with each other, and seem to terminate in an infinite number of ramifications in the substance of the gland, which thereby acquires an uniform, vivid, red colour at every point, appearing more like a dried body than one coloured by blood-vessels, in which circumstances, and the obscurity of its texture, it bears a strong resemblance to the vascular bodies found in the swimming bladder of fishes. The circulation of the blood through the choroid gland appears to be slow and embarrased, as the colour remains in
the part in a considerable degree after it is macerated and preferred in spirits.

The choroid gland likewise receives a number of nervous filaments from the ophthalmic branch of the fifth pair, which proceeds for some way in the same sheath with the optic nerve.

Anatomists are not agreed with regard to the use of this singular part: some have supposed it to be a muscular apparatus, intended to alter the figure of the eye when holding objects at different distances; others, amongst whom is Cuvier, consider it as a gland which secretes some of the humours of the eye; this latter opinion is most consistent with the form and structure of the part, which are very unlike those of any other muscle; but, on the other hand, its situation on the outside of the ruyfiana, and the want of any excretory opening, are difficulties in the way of its furnishing any of the transparent parts of the eye; it appears to us to supply the place of the vascular structure of the choroidies, which membrane is always thin and deficient in blood-vessels in those fishes that possess the choroid gland.

The functions of the choroid case are not, we conceive, yet fully understood; it enjoys a degree of vascularity greater than is found for its supposed offices of secretion; we have examples of the same circumstance in several other organs in the body, but the most striking are the choroid gland and the vascular bodies of the swimming bladder of fishes.

The membra ruylchiana, near the front of the eye, sends off, in some fishes, a triangular process, which palls through the vitreous humour, and is attached to the side of the capsule of the crystalline lens, in the manner of the marfplum of birds. Some very evident vessels which come through the vitreous humour, are transmitted along this process. On the opposite pole of the capsule of the crystalline we have observed the dory (sens faber), and others, the mark of an attachment which appears to be produced by a vessel. This mode of connection between the crystalline and the internal coats of the eye appears perfectly analogous to the pellon or marfplum in the eye of birds, and no doubt answers a similar purpose.

The ciliary process have not been observed to exist in any fish except the tope (flupalus galeus), in which the lamina, according to Cuvier, project as much as in birds, and after forming a short point, which joins the capsule of the crystalline, they are continued with the rixle of the uvea.

Fishes want that coloured appearance of the bottom of the ruyfiana, which is called the tapetum; this membrane is black at every part, except in the ray kind, which have it transparent at the bottom of the eye, and therefore admitting the silver colour of the choroidies to be seen through it.

The iris is in general a very fine membrane in fishes, and so transparent that the uvea is visible.

The uvea has commonly a brilliant metallic colour, which makes the eyes of fishes for striking.

The form of the pupil is round in this clafs, with the exception of the genus ray, in which a very remarkable curtain or veil is continued from the superior edge of the pupil. It is nearly a triangular shape; the base is connected above, and the two sides hang down. There are notched, or rather divided into short stripes or shreds along the edge: they appear gilded externally, but are black on the inside. When the eye is unmoved, the veil is turned up between the superior edge of the pupil and the vitreous humour; but if it be depressed, either by external force or the will of the animal, the veil comes down and entirely covers the pupil. The torpeo has been observed to let down its veil in this manner always at the moment of communicating an electric shock.

In the ray and skat kinds, the carp, genus, and a number of other fishes, the optic nerve has been observed to enter the eye by a round hole, and to produce a tubercle on the inner side, from which the retina goes off in a radiated manner.

In the ray genus, the tubercle of the optic nerve is irregular in its figure, or papillated.

Cuvier has observed in several of the genera salmo, cupra, sponer, porca, gaudus, zeus, and tetradon, that the optic nerve, after entering the eye, and traversing the ruyfiana, forms two streaks or tales; these tails are parallel, but not contiguous, a production of the ruyfiana passing between them. The retina is produced from the opposite edges of these streaks, in the same manner as it arises in birds from the single white line.

The aqueous humour is very small in quantity, or totally wanting in fishes; it is also of a different consistence than in the animals which do not inhabit the water. It is viscid and liquidous.

The crystalline lens has generally in fishes very nearly the spherical form, and in some insects it is a perfect sphere. It is more dense and hard, especially in the nucleus or internal part, than in any other animal, except the cattle bife (eptis). As the aqueous humour is small, the crystalline is in the same degree large in this tribe of animals.

The vitreous humour of fishes is less in proportion to the other parts, and has more consistence than in the animals living out of the water.

Cuvier has furnished us with some tables, partly the result of his own observation, and partly derived from other sources, exhibiting the proportions that exist as to the form, magnitude, density, &c. of the transparent parts of the eye in different animals. We shall extract the following particulars, as serving to explain the optical properties of the humours of the eye in fishes.

The degree of convexity or approximation of the crystalline to a sphere is determined by comparing the axis with the diameter. In the human subject, the axis is to the diameter as 1 to 2.

In the following fishes as below:

<table>
<thead>
<tr>
<th>Fish</th>
<th>Aqueous humour</th>
<th>Crystalline lens</th>
<th>Vitreous humour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salmo (salmo farvis)</td>
<td>9 to 10</td>
<td>25 to 26</td>
<td>15 to 17</td>
</tr>
<tr>
<td>Scard (scard)</td>
<td>10 to 11</td>
<td>14 to 15</td>
<td>14 to 15</td>
</tr>
<tr>
<td>Fike (fike lucus)</td>
<td>11 to 12</td>
<td>15 to 20</td>
<td>12 to 13</td>
</tr>
<tr>
<td>Bristel (bristel barbus)</td>
<td>12 to 13</td>
<td>21 to 22</td>
<td>21 to 22</td>
</tr>
<tr>
<td>Catp (catpina)</td>
<td>21 to 22</td>
<td>24 to 25</td>
<td>24 to 25</td>
</tr>
<tr>
<td>Whiting (whiting melance)</td>
<td>26 to 27</td>
<td>28 to 30</td>
<td>28 to 30</td>
</tr>
<tr>
<td>Mackrel (mackrel scadru)</td>
<td>27 to 30</td>
<td>30 to 32</td>
<td>30 to 32</td>
</tr>
<tr>
<td>Shark (shark)</td>
<td>28 to 32</td>
<td>32 to 34</td>
<td>32 to 34</td>
</tr>
<tr>
<td>Ray (ray)</td>
<td>29 to 34</td>
<td>34 to 36</td>
<td>34 to 36</td>
</tr>
<tr>
<td>Herring (herring baramus)</td>
<td>30 to 36</td>
<td>36 to 38</td>
<td>36 to 38</td>
</tr>
<tr>
<td>Trench (trenchina)</td>
<td>31 to 38</td>
<td>38 to 40</td>
<td>38 to 40</td>
</tr>
<tr>
<td>Eel (mourea anguilla)</td>
<td>32 to 40</td>
<td>40 to 42</td>
<td>40 to 42</td>
</tr>
<tr>
<td>Conger (mourea conger)</td>
<td>33 to 42</td>
<td>42 to 44</td>
<td>42 to 44</td>
</tr>
</tbody>
</table>

The portion of the axis occupied by each of the three transparent parts of the eye is represented by fractions, the length of the axis being considered the unit.
the cod (Gadus morhua) and the ox (bos) ; distilled water being supposed a thousand.

In the ox. In the cod.

Of the aqueous humour 1000 1000
Of the vitreous humour 1016 1013
Of the whole crystalline 1114 1165
Of its external part 1070 1140
Of its nucleus 3100 1200

We have not proved the accuracy of this table, but it appears to be incorrect, particularly with respect to the density of the aqueous and vitreous humours, which are probably greater than are here represented.

We have not a sufficient number of experiments to determine accurately the refractive power of the different humours of the eye. All that have been made, however, as well as common observation, shew that the refrangibility of the humour is much greater in fishes than in terrestrial animals, by which means they are enabled to perceive objects through so dense a medium as water.

The eye in fishes is moved by six muscles, as in the human subject. The one analogous to the trochlearis does not, however, pass through a pulley.

Fishes are not provided with movable eyelids. In the salmon (Salmo), and the mackerel (Scomber), there is at each angle a vertical and immovable veil, which projects a little way over the eye. Moll offious fishes have something of the same structure.

In the moon fish (tetraodon molu) there is a very singular apparatus for covering the eye. This animal can entirely cover its eye by a lid, which contains a circular perforation. This aperture is shut by a true sphincter muscle, and is opened by five muscles which arise at the bottom of the orbit, and proceed in a radiated manner to be inserted into the eyelid.

Fishes, from the nature of the medium in which they reside, do not require any aqueous secretion for keeping the surface of their eyes moist; we therefore do not find a lacrymal gland in any species of this class.

The figures which illustrate the structure of the eye are contained in Plate IX. of the Anatomy of Fishes: fig. 5, exhibits a lateral view of the eye of the skate (Raja batis); a, the eye, flat above and anteriorly; b, the tube of cartilage; c, the cartilaginous peduncle or footstalk upon which the tube is articulated; d, a portion of the cartilage of the orbit to which the footstalk is connected. Fig. 6, is an anterior view of the eye of the skate, with the cornea removed, to bring into view the veil which is seen at a, covering the greatest part of the pupil. Fig. 7, is a section of the eye of the sturgeon (Acipenser Fluro); a, the thick mass formed by the fleshy coat; b, the cavity of the eye. Fig. 8, exhibits a portion of the skin taken from the side of the head of the eel (Muraena anguilla) including the spot covering the globe of the eye which corresponds to the conjunctiva. Fig. 9, shows the choroid gland in the carp (Cyprinus carpio); a, the gland; b, the optic nerve; c, the rufchiana, the choroides being removed. Fig. 10, exhibits the choroid gland as it exists in the cod (Gadus morhua); a, the gland somewhat irregular in its figure; b, the optic nerve; c, the rufchiana; d, d, velvets passing into the gland. Fig. 11, exposes the internal parts of the eye in the dog (Zanu fischer); a, the vitreous humour; b, the crystalline lens; c, velvets passing through the vitreous humours, distributing branches to this humour and the lens; d, production of the rufchiana attached to the capsule of the crystalline; e, the other point of the capsule which seems to have a particular connection with the adjacent parts. Fig. 12, is intended to contrast the spherical form of the crystalline of a fish at a, with the flattened appearance of the anterior part of the lens in a bird, as seen at b. Fig. 13, represents the tubercular termination of the optic nerve in the skate (Raja Batis); a, the optic nerve; b, the irregular or papillated tubercle formed within the eye; c, the retina. Fig. 14, shows the termination of the optic nerve in two threads, as it exists in the cod, and many other genera; a, the optic nerve; b, b, the threads or tails; c, the retina.

**Bones.**

Fishes have been divided by all naturalists into two great tribes, according to the structure of their skeleton; those of the one have been called the cartilaginous, and those of the other the offious fishes. This division, although justified by the difference in the composition of their bones, and proper as being confin'd with natural habits and structure, is nevertheless not strictly correct; for the skeleton of the cartilaginous fishes possesses some calcareous matter, and the bones of the offious fishes contain in general a much smaller quantity of earth than is found in those of other animals: if they were compared with the bones of mammals, or of birds, they would themselves deserve the epithet of cartilaginous. The composition is not uniform in the different bones of a fish's body; some contain a greater quantity of phosphat of lime than others; the cranium, spine, and the thick bones, are hard, white, and opaque in the offious fishes, but the thin bones are flexible and transparent; and in the cartilaginous tribe, although we can as readily cut with a knife many parts of their skeleton as we could common cartilage, yet their cranium and spine give considerable resiliency, especially in the larger species, and present more of a fibrous texture.

The structure of the skeleton is more purely cartilaginous in the fishes with fixed branchiae, as the ray and shark genera, than in the order of cartilaginous fishes called branchiostegi.

The colour of the bones of fishes does not appear to be subject to much variety; one species, however, the gar fish (Esox Belone), is remarkable by having the whole skeleton green.

The skeleton of a fish is, in its general form and mechanism, so very unlike that of other animals, that a person at first view would not suppose there existed the most distant analogy between them; but after examining the parts in detail, and comparing their relations to each other, we are astonished by the correspondence which prevails between them, and the pieces of the skeleton of mammals. Nature is always economical in her means, and never deviates from the type, or creates a new part, until all the modifications which the organ is capable of receiving be exhausted. The combination of simplicity of design with diversity of effect, cannot be more strongly illustrated than in comparing the anatomy of the skeleton of fishes with that of the other classes.

The skeleton of the chondrostegii, and of the genus ray in particular, differs as much in form as in composition from that of the offious fishes; it likewise bears less analogy to the skeleton of other animals; we shall therefore postpone its description until we have given an account of the bones of offious fishes, for which purpose we shall take in general the dog (Zanu fischer), as affording one of the best examples of the osteology of this tribe of fishes.

The bones which compose the cranium are all united by a species of sanguine fluid; they not merely overlap each other, but the edge of each bone forms a great number of irregular, sharp, thin procHces or spicules, which are inserted into one another; the union thus produced does not admit of
of any motion of the several parts, and the cranium appears to be composed of a single piece. Cuvier says that the bones of the cranium are anchylosed with each other; but we have not found the usual number of bones to be distinct in the cranium of even old fishes, but the portions of which each bone is originally composed to be separable from each other. To be satisfied of this fact it is only necessary to examine the skull of a fish that has been thoroughly cleaned and bleached by long maceration in the sun, and expose to the weather, many of which are frequently found lying on our shores: these skulls we have been enabled to separate into portions, corresponding to the frontal, parasit, temporal, sphenoidal, and occipital bones, and to divide again the frontal and occipital bones into two pieces each.

The external form of the cranium is very irregular, and varies in different fishes. In the doré it has two flat sides, which have an oblique direction, like the roof of a house; the top or part corresponding to the ridge is an irregular hollow or groove; the posterior part of the cranium is much larger than the anterior; it is truncated or flat, except two thin processes corresponding to the occipital ridge; the anterior portion of the cranium is slender, elongated, and slightly arched, somewhat resembling the superior mandible of a bird; under this part there is a very large vacuity, through which most of the nerves pass out. The inferior part of the cranium is depressed on each side, and then forms a remarkably strong process, which is analogous to the basi-fiallary, and extends from the condyle, with which the spine is articulated, to the bone analogous to the vomer, of which more will be said hereafter. The parietes of the cranium, corresponding to thesituation of the organs of hearing, are thin, cellular, and exhibit an irregular fossa externa; in many fishes the sides of the cranium are not flat and sloping, but spread out into a thin edge, nearly on a plane with the superior part; there is often also a sharp thin spine extended along the medial line of the superior part of the cranium, which, in some species, extends high, and projects considerably from the back of the head, in order to give attachment to the muscles and ligaments of the spine. The lower part of the cranium is most commonly, in offene fishes, enlarged on each side of the basi-fiallary process.

The cavity of the cranium has been thoroughly cleaned, is much larger than the brain; it is extremely irregular upon the internal surface, furnishing a number of craggy and spiculated processes, impossible to describe: it is not, therefore, adapted, as in other animals, to the form of the brain. It is more nearly oval than any other figure.

In the account given by Cuvier of the bones of the face, he does not appear to us to have named the different pieces according to their true analogy, or likened to the parts composing the face of other animals. In the doré, from which we take our description, the bones of the face are large and very distinct.

There is no effusum septum to the orbits; the eyes are separated from each other only by membrane. In the genus

FISH.

the anterior part of the os frontis, on each side of the nasal bones.

The bones which supply the place of the ethmoidal of other animals are situated before the os frontis, immediately

below the last mentioned; they extend obliquely from the frontal to the malar bones, with which they are articulated; they form the anterior margins of the orbits.

The nasal bones are supplied by a strong process of an arched figure, which is continued from the middle of the anterior part of the os frontis, under the posterior end of the inter-basal bones, which move thereon. From this bone there arises a thin plate, which is analogous to the effusum septum of the nasal cavity, and which is united to the vomer.

The vomer is a bone of a singular form, it is long, and paits in a straight line from the basifiallary process of the occiput, with which it appears to be really anchylosed, along the superior part of the palate, and ends anteriorly in a thick broad extremity, somewhat resembling in figure a horse's foot, which is commonly armed with teeth: this bone serves as the baffe to the septum of the orbits.

The bones we have called the malar, Cuvier appears to consider as analogous to the palatine; they are thick, short, and irregular in shape; they are articulated with the zygomatic bones, with those analogous to the ethmoidal, with the superior maxillary, and with the articular bones, which will be hereafter described; they send processes backwards and upwards, which contribute to form the vault of the palate.

The superior jaw is formed of four pieces, which are connected to each other, and to the adjoining bone, by ligament, in such a manner as to permit a considerable degree of motion; the two external pieces correspond to the superior maxillary bones; the intermediate ones to the inter-basal bones.

The maxillary bones are two arches placed with their convexity outwards; they are broader and thinner at their extremities than in the middle; near their superior end they furnish a thick process, which projects anteriorly like a small cone, and presents on the surface next the mouth a rounded ridge; from entering into the composition of the roof of the mouth, some perils would perhaps consider them analogous to the palatine bones. They are connected by ligament with the malar bones superiorly, with the coronoid processes of the lower jaw inferiorly, and anteriorly with the articular bones.

The part of the upper jaw that corresponds to the inter-basal bones forms the superior margin of the mouth, and is commonly furnished with teeth; it is composed of two pieces, which are united to each other by ligament and cartilage; each of these sends off posteriorly two thin plates, and one long round process; the first slide under the maxillary bones, and the round processes are tied together by ligament, and move in a sheath which is thus formed upon the nasal bone: a free motion of these parts on each other becomes necessary in the protrusion, the opening, and the shutting of the mouth.

The inferior jaw consists of two triangular shaped pieces, which are united to each other by ligament at their anterior part: the angle of those pieces that is placed upwards corresponds to the coronoid process; the articulation is situated near the posterior angle, and this last corresponds with what is called the angle of the jaw in mammals. The middle part of the pieces composing the lower jaw is either of extremely thin cartilage or membrane.

The lower jaw is articulated with a bone analogous to that to which Cuvier has given the name of the figure bone, ("os quarre") but which we have preferred calling the articular bone in the description of the anatomy of birds, from the circumstance of its being interposed between the articulation of the jaw and the cranium.

The
The articular bone is composed of several pieces firmly united together; they produce a considerable extent of surface on the side of the head in the dory: one piece, which is of some strength, is articulated with the under surface of the temporal bone, from which it proceeds downwards and forwards in a curved manner, declining in thickness as it descends: this piece furnishes the thin bone of the operculum, and receives the horn of the os hyoides: over this piece there is another thinner one laid; they are apparently anchoylofed with each other, and the external one commences a short distance from the cranium, by a sharp distinct point, and goes on to the articulation of the lower jaw: another ossous piece is articulated below, and anterior to the orbit with the inferior end of the malar bone, from which it proceeds directly downwards to join the anterior end of the other piece, and forms with it the articular surface for the joint with the lower jaw. The intermediate space left between these pieces, which is very considerable and of a triangular figure, is filled up with a very thin plate of cartilage, which is in parts ossified. The articular bone in fishes is evidently formed to carry the lower-jaw forwards, and thus to facilitate the protusion and dilatation of the mouth, and for affording a surface for the attachment of the muscles of the jaw; it is therefore found much larger in this class than in birds.

The part corresponding to the os hyoides is formed by two flat ossous plates, which meet together anteriorly upon the bone which furnishes the tongue, and separating from each other posteriorly encompases the gills; a small round branch goes off from the external end of each plate; these are analogous to the horns of the os hyoides, and become attached to the internal surface of the articular bone by ligaments, which allow the hyoides to move nearer or farther from the cavity of the mouth: each plate of the hyoides is composed of several pieces, the edges of which are in a certain degree anchoylized with each other: there are six pieces observable on each side in the dory. Cuvier states these to be the usual number.

There is a very thin ossous plate situated between the anterior ends of the two sides of the hyoides, and the junction of the f.e.palmus; it is connected by pieces of ligament to each side of the os hyoides, to the lingual bone, and to the scaphula, where they meet: this bone has almost exactly the outline of a heart, it has therefore been called the cordiform or heart shaped bone; it is peculiar to fishes, but does not appear to have any other use, than to afford attachment to the strong muscles situated at this place.

There are a number of bones that are peculiar to the organs of respiration and of deglutition in this class of animals, which require a connected description: these are the branchial arches, the pharyngeal bones and the bones which furnish the operculum or Gill cover, with those of the membranous branchiologe.

In describing the organs of respiration we have stated that each of the gills is furnished upon an arch of bone: each branchial arch is composed of two pieces or limbs, two of the ends of which are enjoined by ligament in such a manner, that the other extremities can be moved nearer or farther asunder, and thus the arch rendered narrower or wider: the inferior limb, or that next the cranium, measures about one-third of the whole arch, and the inferior about two-thirds of its extent. The branchial arches are placed, with respect to each other obliquely in rectell as they are commonly thinner, thin bones, and have four sides, or rather four edges and two sides: the convex edge is directed outwards and backwards: it is upon this the lamina of the gills are planted: the concave edge is turned forwards and upwards, towards the mouth. Along the external or anterior side there are usually a number of small ovisous eminences, placed at short distances from each other, which project a little beyond the concave edge: these do not commonly arise from the bone, but the membrane covering it: they are furnished with teeth, which are thence called the branchial teeth, as already described. The inferior extremity of the branchial arches is attached to the cranium along the sides of some small ossous pieces, which are situated in the lower part of the mouth, and appear as the continuation of the lingual bone: these bones vary in number in different species, but they are firmly united to each other, so as to form a part of the skull, to which the branchial arches are adhered like ribs. The inferior surface of these bones is smooth, but inferiorly they furnish some processes, through which some of the branches of the branchial artery pass to the gills.

From the posterior extremity of this piece of the cranium there arise two slender branches, which separate from each other in the manner of horns, and in form to the flattened surfaces or disks: these are the inferior pharyngeal bones, and are, as before observed, commonly covered with teeth.

The superior extremities of the branchial arches are indirectly connected with the base of the cranium: a slender footstalk is articulated at one end with the superior extremity of the posterior arch, and at the other with the base of the cranium; the superior extremities of the three anterior arches of each side terminate upon two flattened bones, which are called the inferior pharyngeal bones; from the upper edge of which a second footstalk goes off, and is attached to the cranium, on the inner side of the one just mentioned.

In consequence of this sort of connection between the branchial arches and the cranium, two add. cart joints are created, by which the fixation of the arches, and the approximation of the inferior pharyngeal bones to each other, and to the inferior pharyngeal bones, are more easily performed; the muscles likewise which move these parts can considerably power by their whole force operating upon the points at which they are inserted.

Cuvier states the connection between the branchial arches and the cranium of ovisous fishes in a manner somewhat differently than we have described it above. He says the superior extremities of all the four arches are attached to the inferior pharyngeal bones, when these exist, the two posterior arches by an articulation, which almos of a jaw motion; and the two anterior arches more closely; for this purpose, the fish arch bridnorca and leads to the pharyngeal bone a strong ligament from one of its branches, which the other is immediately joined to the cranium.

In the flerus anguillaris, which has but one large pharyngeal organ situated under the superior extremity of the last arch, this extremity unites with that of the third arch, and converges with that of the first towards the base of the cranium.

In the pale ( Gson holin) the two last arches unite at their superior extremities to the fish, which, as well as the first, is articulated with the cranium.

In the carp ( Terytira,) which has not movable superior pharyngeal bones, the superior extremities of the four arches are approximated and articulated with a common piece, which is united to the cranium.

In the front ( Terytira,) the superior extremities of the six arches are united by several pieces, the governor of which bears a small plate covered with teeth, at the place where it is united with the extremity of the last arch. The bone of which form the operculum are generally two.

The principal one has a triangular figure; it is very thin at every part, except at the superior angle, at which place it

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forms a sort of neck, and a little prominence or head, in which there is a depression that is joined to a corresponding process, on the back of the upper end of the articular bone. This bone of the operculum has a degree of rotatory motion, in addition to those of elevation and depression. The other bone of the operculum is long, narrow, and thin, and resembles the blade of a knife; it lies posterior to, and nearly parallel with, the articular bone; it is not joined to any bone by articulation, but is connected by ligaments posteriorly, with the triangular bone of the operculum, and the back part of the os hyoideum, and anteriorly to the angle of the lower jaw. The use of this bone seems to be chiefly to furnish the integuments which are extended over this part.

The **offense rays**, which support the **membrana branchiostega** are attached to the posterior margin of the broad bones of the os hyoideum; they increase in size from before backwards. There is an interval between the origin of the first three rays, and that of the four posterior rays, which, however, does not cause any material irregularity in the succession of the points of the rays. These bones are capable of being elevated and lowered, of being approximated and expanded. The elevation and expansion of the posterior rays are opposed, beyond a certain extent, by a process from their roots.

The **vertebrae** are divided by Cuvier into two classes; the first are the **abdominal** or **dorsal**, which have spinous processes from the superior side of the spine only; the second are the **caudal**, which have spinous processes from both the upper and lower bones of the spine; but this distinction is not quite correct, as the posterior abdominal vertebrae furnish short spinous processes inferiorly; the caudal vertebrae may, however, be reckoned with propriety from the large bone, which forms the posterior boundary of the abdominal cavity.

The bodies of the vertebrae vary with respect to figure in different fishes, being cylindric in some instances, and angular or compressed in others; they are all, however, distinguished by having the surfaces by which they are conjoined hollowed out to form a semi-elliptical or conical cavity: these cavities are opposed to each other, and thus produce, throughout the whole spine, a chain of cavities, each of which is nearly of a spherical figure, and alternates in succession with the vertebrae; these cavities are furnished with concentric layers of cartilage, or rather a peculiar intervertebral substance, which somewhat resembles ligament, but is highly elastic: these concentric layers complete the form of each cavity, and constitute the bond of union between one vertebra and another. The interior part of the cavities is actually filled by fluid.

The centre of each vertebra, which is very thin, is perforated with a small hole, which is lined by the same substance that invests the cavities; a communication is thereby established between the cavities, the whole length of the spine, which is probably designed to obviate the compression of the fluid in the different cells or cavities during the motions of the spine.

By this species of articulation of the vertebrae with each other several advantages are obtained; strength and lightness are bestowed on the spine, and a great facility of motion, as every vertebra rolls upon a globe composed of an elastic substance, and of fluid. The first vertebra is articulated with the opisthocranum in the same manner as those of the spine are with each other.

The external surface of the vertebrae are very generally marked by a number of depressions or little cavities, in the longitudinal direction of the spine, which give to the circumference of each vertebra very much the appearance of being constructed of short pillars, with regular spaces between them. This structure diminishes very considerably the weight of the spine, without subtracting from its strength.

The spinous processes of the vertebrae are commonly long, slender, sharp-pointed bones; they arise from the superior sides of the bodies of all the vertebrae, and from the inferior sides of the caudal, and some of the last dorsal or abdominal vertebrae. They originate in the lower surface of the caudal vertebrae we believe always as two processes, which coalesce, and form a triangular space, in which the blood-vessels of the tail pass along the spine. They are double at their roots in the pleuroneurides and other fishes, along the superior part of the spine also.

The inferior spinous processes of the last dorsal vertebrae are short, imperfectly formed, and have their extremities applied and flattened to each other, in order to furnish the large bone that forms the boundary of the abdominal cavity, of which more hereafter.

The first vertebra of the tail has its extremity spread out in the figure of a fan, which appears to be composed of a number of offens rays united to each other.

The ribs are sometimes wanting in fishes, and, when they do exist, are usually very small.

The generis **filarius, cyprinus, and chetodon**, however, furnish examples of fishes with strong ribs, which surround the abdominal cavity almost to its top.

In the herring **genus (clupea)**, the **zeus vanner, &c.** they unite in a fort of **flerum**.

In many fishes the ribs divide at their extremities into two branches; it is very common also to meet with a second row of ribs, which arise above the others; these are usually fewer in number than the proper abdominal ribs, and pass between the portions of the lateral muscles.

The **flerum** but rarely exists in this class of animals, as the ribs seldom extend as far as the inferior part of the body.

In the dolph (**zeus fader**) there is a species of **flerum** formed by a number of irregularly shaped offens pieces, which appear to be only connected with each other by ligament, and the common integuments. They are furnished with sharp spines externally, and are hollow next the cavity of the body.

The membrea which correspond in fishes to the anterior and posterior extremities of other animals are the **peloral** and **abdominal fin**.

The **peloral fin** is sustained by a very considerable bone, which, with the corresponding one, surrounds the body immediately behind the aperture of the gills. Cuvier has, from hence, called them the **girdle-formed bones**; he likewise considers them as analogous to the scapula, in which he is justified by their position, and some circumstances in their formation. These bones are articulated with the inferior and posterior part of the cranium; they pass backwards and outwards, as far as the middle line of the body of the fish, during which course they are narrow, flat on the external surface, and have a round ridge along their internal surface. They then make a turn forwards and inwards, and meet each other a short distance behind the os hyoideum. At the place where they turn forwards, they send a thin, sharp process backwards, and soon after they receive, in articular depressions, the ends of two long, slender, three-sided bones, which pass from below upwards, across the muscular parietes of the abdominal cavity. Some anatomists consider these bones as being analogous to the **elaioides**; Cuvier does not allow it, but without laying the grounds of his objection. It is sufficiently plain, however, from their position and connections, that there are no other
other bones, except the clavicles, or the fork-shaped bones of birds, with which they can be compared.

It is the inferior half of the scapula that properly corresponds with the bone which bears that name in other animals; the other portion seems to be a part added in fishes, in order to give firmness to the whole member, by connecting it with the head, and likewise to carry the pectoral fin farther down upon the body. The inferior portion is broad and thin, and furnished with a thin, fleshy process, or rather plate, which runs along each side of the bone, near the anterior edge, which may be compared with the spine that divides the surface of the spine in mammals.

The osseous rays which compose the pectoral fin are connected to the posterior edge of the scapula by means of a number of small bones, that seem to perform the office of a corpus, and with which it should perhaps be considered to correspond. Each oseous ray, towards the extremity in particular, consists of a succession of minute bones, closely united to each other; these might be compared to the joints of the fingers.

The above description of the pectoral member has been taken from the dory (zeus faber); it is necessary, therefore, to mention some varieties of structure that exist in other fishes.

The pectoral fin does not exist in some fishes, as the genera muraena and sebenites.

The bone, which is formed by the union of the two inferior extremities of the scapula, is very acute in those fishes that have the body compressed vertically; but in those with a depressed or flattened body, the scapula turns inward, and meets each other nearly in a straight line.

The number of carpal bones varies; Cuvier states, that there are four large bones of this kind in the wolf fish (anarhichias lupus), the red gunner (trigla eucanu), and in the armed and flying trigle (trigla cataphracta and trigla voletens); four small bones in the genus pleurocetes, and the evening (gadus merlangus); eight small bones, in two rows, are found in the dory (zeus faber); three small cylindric bones in the flurus, and five in the echolonus, porches, &c.

When the first rays of the pectoral fin are spiny, they are composed of single sharp-pointed bones; they are attached immediately to the scapula.

In some of the genera flurus and gasterostons the articulation with the scapula is so contrived, that the fin can at pleasure lay the spine close to the body, or place it erect, and keep it fixed in that position; there is a cylindric tubercle formed on the spine, in the front of which there is a hole. The spine of the fin is articulated with this cylinder by a depression, which has a projecting process before and behind it. When the spine is extended, the anterior process, which has the figure of a hook, enters the above-mentioned hole, and the spine turning a little on its axis, the process is hooked upon the edge of the hole in such a manner, that the spine cannot be inflected until it makes a turn upon its axis in a direction opposite to the former.

The ventral fins which correspond in fishes to the pectoral extremities are sometimes wanting, or situated at different parts of the inferior surface of the body. They do not exit amongst the cartilaginous fishes, in the genera petromyzon and fignathus; and in some species of balistes, ofracion, tetraodon, &c.

The orders of the oseous fishes are determined by naturalists from the absence or position of these fins; thus all the apodal order want the ventral fins. The anguilliformes have them situated under the throat, and before the pectoral fins. In the thoraces they are placed below the pectoral fins, and in the abdominal order of fishes the ventral fins are found under the belly, which is their proper situation, or that which their name implies.

The bones analogous to the pelvis, and which sustain the rays of the ventral fins, are various in their figure and position, with respect to each other. They are more commonly flat, and have the internal edges applied to one another in the jugular and thoracic fishes; but their inner surfaces and external or inferior edges are more or less separated, in order to accommodate the muscles which approximate and retract the rays of the fin.

In the dory (zeus faber), the pelvic bones are triangular plates, slightly concave on the surfaces next each other, and furnished with a spinous edge on both the surfaces; one angle, which is very acute, is directed obliquely inwards and forwards, towards the cavity of the body; the other angle produces a long fleshy process, and the anterior angle is blunt or a little rounded: both the anterior and posterior angles are connected by a ligament to the chain of bones forming the sterneum in this fish. The rays of the fin are articulated to the middle of the inferior surface, and not to the anterior angle, as stated by Cuvier.

We are indebted to this anatomist for some details of the structure of the ventral fins in several fishes.

In the eel (anguilla), and the flur-angler (uranophorus), the pelvic bones are adhered together at their internal edge; their inferior surfaces are opposed to each other, and leave between them an oval space. The angle of their junction projects within the cavity of the abdomen.

In the genera cottus, sebena, chleterus, and pescs the bones of the pelvis are also united at their internal edge; they are flat and long, and their external edges are directed downwards so as to form a fossa.

In some of the sticklebacks (gasterostes) the pelvic bones are separate, extremely long, and receive near their middle a movable spine, which occupies the place of the fin.

The zeus vulgar has these bones small and cylindrical. The pelvic bones are not connected to the inferior points of the scapula in the abdominals, as they are in the jugular and thoracic fishes.

In this order of fishes the bones of the pelvis are also, according to Cuvier, generally unconnected with each other, and are preferred in their situation by ligaments.

In the carps (cyprinus) they are long, and only touch about one-third from their lower end.

The herrings (clupea) they are very small, close together, and form an addition to the little bones that supply the place of the sterneum.

The pelvic bones in the pike (esox lucius) are broad and triangular; they are close together at the anterior extremity, but diverge at the posterior end, which is broader and receives the rays of the fin.

In the anableps these bones are very far apart, and bear upon their external border a very long spine, which extends towards the vertebral column, and is placed in the direction of the ribs.

In the genus flurus the pelvic bones are united to each other; they have the shape of an elongated, round in the middle, and often spinous in front. The rays of the fin are attached to their external and posterior edge.

These bones are subdivided into one piece in the genus heriocaris. The fins are conjointed to the outward edge.

The osseous rays of the ventral fins are similar to those of the pectoral fin, but in general shorter; the ventral fins are capable of being moved forwards or upwards, and of having their rays expanded, and of being brought backwards, closer together, and of having their rays approximated and folded.

The dorso, caudal, and anal fins are members superadded.
to fishes, to afford in the motions of swimming; they vary in number and extent in different species, which peculiarities it is the province of the naturalist to point out. They consist of a number of oblong rays which resemble those of the pectoral and ventral fins. The first rays of the dorsal fin are, however, frequently fleshy spiny bones, and those of the tail are generally longer, exhibit more of a jointed appearance, and are more frequently bifurcated at the extremities than the other fins of the body.

The rays of the caudal fin are furlain upon the posterior edge of the fan-shaped extremity of the last caudal vertebra, with the intervention of some small bones, which resemble the carpal bones of the pectoral fin.

The rays of the dorsal and anal fins are supported upon the extremities of long, slender, spine-shaped bones; the other extremities of these bones alternate with the extremities of the superior and inferior spiny processes of the vertebrae, to which they are attached by ligament.

These additional spiny bones are intended to increase the lateral surfaces of fishes; we therefore find them, as well as the real spiny processes of the vertebrae, long in proportion to the breadth of the body; in the flat fishes (plano-nelte) they are particularly long.

The additional spines, in some instances, as the dog (zeus faber), are united to each other by thin cartilaginous lamina, and furlain similar lamina in a vertical position with respect to the spines, by which means regular flaps are produced on each side for the muscles of the posterior part of the dorsal and the anal fins.

It remains, to complete the account of the skeleton of ossiferous fishes, to describe the bone which forms the boundary of the abdominal cavity; this bone is not unfrequently the strongest in the whole body; it is of an elongated shape, and slightly bent, rounded, and very smooth on the side next the cavity of the abdomen; it appears in many fishes like a large inferior spiny process of the vertebrae, but it is in reality a bone interpolated between some of the spiny processes of the dorsal vertebrae, and some of the additional spines of the anal fin, with both of which it is united by a sort of firm union, which appears like an archyloysis.

This bone is extremely useful in binding together and giving firmness to the pliable fabric of the tail, which otherwise would not be able to sustain the impulsion of the water during the actions of swimming. It likewise affords a smooth and firm boundary to the abdominal cavity.

The skeleton of the flat cartilaginous fishes differs in much from those above described, that it is almost impossible to discover any analogy between many of these parts.

The subjuncts we shall clime as examples of this genus of fishes are the thornback and flate (roja clarvata and roja buia).

The cartilaginous pieces which compose the cranium are so intimately united, that it is difficult to recognize them: futures, however, are discoverable, which mark out pieces that correspond to the temporal, occipital, and parietal bones.

The form of the cranium is nearly that of an oblong figure, somewhat enlarged, and irregular posteriorly. The internal surface corresponds with the external form, except where the organs of hearing are contained, at which places the cavity of the cranium is proportionally diminished.

The cavity of the cranium is also prolonged anteriorly, or, more properly speaking, is continuous with the cavity of the mouth, which renders the disproportion between it and the brain even greater than in other fishes.

The foramina for transmitting the olfactory and optic nerves are at opposite sides of the cranium.

The parts composing the face in the flat chondropterygii are few, and very unlike the bones of the face in other animals.

The cranium, as before observed, is continued anteriorly into a long, slender, hollow cartilage, which forms the central part of the snout.

Where this cartilage commences from the cranium, there is placed on each side of it a hollow cartilage or box, nearly of an oval figure, which contains the organ of succincting.

The cartilages of the snout and organs of succincting might be considered as analogous to the nasal and ethmoidal bones, the vomer, and sphenoid, united together.

Upon the external parts of the bones holding the organs of succincting, there is articulated a small irregular trunca phosphoryed cartilage, which is bent backwards: this appears to supply the place of the malar and zygomatic bones.

Both the jaws are situated under the cranium, and are sustained upon two elongated cartilaginous pieces, which correspond in office, though not in figure, with the articular bones: these pieces are connected by one of their extremities with the lower jaw, close to the articulation; and by the other extremity with the parts of the cranium which correspond to the temporal bones. The jaws are two cartilaginous rims, nearly of the same size at every part; each jaw has a movable articulation at the lympthias, by which means they can be protruded, and the figures of the mouth altered. The jaws are articulated with each other, by a round tubercle of the superior jaw being received into a socket in the inferior jaw.

The tongue is wanting, as before observed, in the ray genera. There is, however, a rim of cartilage extended between the two first branchial arches and under the membrane, lining the lower part of the mouth, which takes the place of the lingual bone, and when the mouth is widely opened forms a projection, which has been mistaken for a tongue in these fishes.

The part corresponding to the intermediate bones which sustain the inferior extremities of the branchiae, are two thin pieces of cartilage, which are united in the middle, at the posterior part have a pointed shape, and terminate before in two horn-like processes.

The cartilages which appear most analogous to the byldes are two branches which arise from the external edges of the thin pieces just described, and two other branches which are attached to the sides of the cervical spine immediately behind the last branchial arches: the branches from the intermediate cartilage ascend backwards and outwards: those from the spine descend in the same direction; they are united to each other on the anterior part of the scapula, to which also they are connected at their point of union.

The branchial arches are very strong in this genus, and the joints have a freer motion than in other fishes, by which the extremities of the arches can be brought closer to each other: a number of cartilaginous rays also arise from the convex side of each arch, which pass between the rows of the membranous lamina, as already mentioned. The inferior extremities of the arches are articulated with the cartilage, which takes the place of the cervical vertebrae, and not with the cranium, as in other fishes.

The spine is articulated with the cranium by two condyles, between which the spinal canal projects a little, and is received into a deficiency of an arched figure formed on the superior and inferior sides of the foramen magnum.

The cervical vertebrae are consolidated into one piece; on the superior and lateral parts of which cartilaginous plates are produced, which correspond to transverse and spiny processes.

The dorso and caudal vertebrae are distinct, as in other fishes.
The former furnish from the superior part of their bodies small, thin, square plates, which are connected to each other by ligament. The last have their lateral surfaces excavated by similar processes on their superior part, and some projections also inferiorly; they, however, gradually decline, and towards the extremity of the tail are feebly to be discerned. In the thoracobac (Tria cheiota), the superior processes fall into, besides the dorsal fin, a row of hook-shaped bones, which have their points turned backwards.

The bodies of all the vertebrae, except the cervical, which form but a single piece, are united by elastic ligaments; the inter-vertebral joints contain a fluid, and each vertebra is perforated in the centre by a small hole, in the same manner as in fishes generally.

A favourable opportunity for examining the nature of the inter-vertebral articulation occurred to Mr. Home: in the dissection of the bogfish Sauries (Sauries maximus). "Four days after the fish was brought on shore, the inter-vertebral substance being cut into, a limpid fluid rushed out with so much velocity that it rose to the height of four feet. At the end of twelve days a portion of the spine was examined, the inter-vertebral joints of which had been preserved entire: upon sawing through two of the vertebrae a fluid was met with, of the consistence of liquid jelly, with clots of different sizes floating in it; so that in eight days a considerable tendency to coagulation had taken place, although the fluid was entirely excluded from the air."

"The cavity between every two vertebrae was found to contain, in the Sauries, about three pints of liquid. When this fluid was evacuated, the elastic ligamentous substance which united together the concave surfaces of the two contiguous vertebrae, brought the ends of the vertebrae within an inch and one-half of each other, in which state the inner layers of the ligaments, which are less firm in their texture than the outer, project into the cavity, and may be mistaken for a part of its natural contents: this portion, when soaked in water, swells out to a considerable size, the water readily infusing itself between the layers of which it is composed."

"The whole thickness of the ligaments is about one inch, the external half of which is compact and elastic; the other appears to possess a very high degree of elasticity."

Mr. Home adds that the gelatinous substance which fills the inter-vertebral joints of other fishes is fluid during life, which fact was verified in the Sauries (Sauries bat). Mr. Bodie found that in the hog and rabbit the central part of the inter-vertebral joints contains a cavity with a smooth internal surface, of the extent of half the diameter of the vertebra, which is filled with a thick gelatinous fluid; and we have observed the same fact in other quadrupeds, from which it would appear that the mode of articulation in the spine of fishes is not absolutely peculiar to them.

Mr. Home describes the structure in the spine of theurgeon (Aipenser fluvior) as being different from that of other fishes.

"There is," he says, "extremely, the common appearance of regular vertebrae; but these prove to be only cartilaginous rings, the edges of which are nearly in contact, and are united together by elastic ligaments, forming a tube the whole length of the spine. This is lined, throughout its internal surface, with a fine, smooth, elastic substance; within this is a soft, flexible substance, in a small degree elastic; in the centre there is a chain of cavities in the form of lozenges, containing a fluid, and communicating with one another by very small spouts. The spine of the lamprey el (Petromyzon marinus) is found to resemble that of theurgeon."

The above structure is not so different from that of the spine of fishes in general, as it would at first seem to be; since we have discovered the communication between the inter-vertebral cavities to exist both in the cartilaginous and bony tribes of fishes.

Cuvier states that there are no ribs in the chondropterygii; but we find on the sides of the bodies of the dorsal vertebrae a number of short-pointed processes, which might be considered as rudiments of these parts.

The pectoral member of the ray genus is peculiar in its form and direction, and is of prodigious magnitude. The pieces which form the rays of the fin are analogous to the feathers; they are connected with the back part of the dorsal spine by means of two thin, flat cartilages. They pass outwards, enlarge, and form two wide foramina on each side, through which the nerves and vessels pass to the fin. The scapula next produces two branches, one of which affords backwards nearly parallel with the spine, and the other goes forwards as far as the anterior part of the head; these branches have several joints in them, by which they can be moved nearer and farther from the body.

The scapula are united on the under part of the fish by a strong cartilaginous bar, which supplies the place both of the sternum and clavicles. The rays of the fin arise from the external side of the branchial, which is slightly concave; they are exceedingly long, particularly in the middle of the fin, and each composed evidently of many joints. It is upon the great number and extent of the rays of the pectoral fin that the peculiar square figure of the flabit chondropterygii depends.

The pectoral fins of the Sauries are constructed upon the same plan as in the genus Sauries, but are much smaller, and are not connected to the spine.

The ventral fins are supported upon the extremities of a transverse piece of cartilage in the chondropterygii, which is situated at the posterior part of the abdomen; it is not attached to the spine, but held in its place by its connection with the muscles.

The external rays of the ventral fin in these fishes are stronger than the others, and are composed of some pieces articulated to each other in succession, which very much resemble the joints of the digit in other animals, and which, therefore, form the analogy which exists between the rays of the fins of fishes in general, and the fingers or toes of the amniotes.

Figs. 1. Plate XII. of the Anatomy of Fishes, exhibits a lateral view of the skeleton of the dog (neus flexor); a is the cranium; b, the cavity between the two orbits; c, the sphenum; d, the part corresponding to the lacrymal bone; e, the piece which appears analogous to the ethmoidal bone; f, the nasal bone; g, the ossicus flatus, which comes from the occiput to join the vomer; h, the bone analogous to the malar, or the palate; i, the superior maxillary bone; k, the intermaxillary bone; l, the inferior jaw; m, the articular bone by which the lower jaw is connected to the head; n, the os hyoideum, on the edge of which are seen the rays of the membrane branchiole; o, the lingual bone; p, the principal bone of the operculum; q, the other bone of the gill-cover; r, the superior pharyngeal bone; s, the branchial arches; t, the inferior pharyngeal bones; u, the cordiform bone. As these last parts are situated internally, they are seen imperfectly; r, the operculum; s, the bone analogous to the clavicle; t, the carpus, on which are arranged the rays of the pectoral fin; u, the chain of bones formed under the integuments, in the manner of a flipper; w, the pelvis, on which are seen the rays of the ventral fin; x, y, z, the cervical, dorsal, and caudal divisions of the spine; from the two flaps of which long, spinous processes are seen to proceed upwards, and to furnish the additional
tional spinosus bones on which the dorsal fins are articulated. From the inferior part of the caudal, and some of the last dorsal vertebrae, spinosus processes are seen to arise, which become connected with the additional spines supporting the anal fin, and of which some are united to the extremity of the bone that bounds the abdominal cavity. The extremity of the tail produces the fan-shaped bone, which bears the caudal fin; y, the true or abdominal ribs; z, some spimnary ribs which are designed to pass amongst the muscles of the spine.

Fig. 2. of the same plate, shows the cavity which exists between the vertebrae of an offcous fish; a, a, two of the vertebrae of the turbat (pleuronektes maximus), divided longitudinally; b, b, ligamentous tubercles by which they are united; c, the internal vertebral cavity.

Fig. 3. of Plate XII. of the Anatomy of Fishes, gives a view of the cavity in one vertebral; a, the body of the bone; b, spinosus processes partly cut away; c, the canal for holding the spinal marrow; d, the concavity of the intervertebral joint; e, the foramen, or rather short canal, by which the inter-vertebral cavities communicate with each other.

Fig. 1. of Plate XIII. of the Anatomy of Fishes, represents the inferior parts of the skeleton of the thornyback (rhgus clavara); a, the cranium; b, the cartilage which forms the middle of the fin; c, c, the oval cavities for containing the organs of smelling; d, d, the branches articulated upon the external part of these cavities; e, e, the two jaws; f, f, the cartilages analogous to the articular bones by which the jaws are connected to the cranium; g, the rim of cartilage that supplies the place of the ligamental bone; h, the intermediate cartilage to which the lower extremities of the branchial arches are united; i, i, the inferior branches which seem to supply the place of the os hyoides; j, j, the superior branches of the same; k, k, the vertebrae; l, l, the cervical portion of the spine, consolidated into one piece; n, the dorsal portion of the spine; o, the caudal division; p, p, short processes from the files of the dorsal vertebrae, that correspond to the ribs; q, the transverse bar that answers for clavicles and sternum; r, r, r, r, the branches of the scapula; the bodies of the scapula, and the connection of these parts with the spine, are in a great measure concealed from view; s, s, s, s, the rays of the pectoral fish; t, the transverse cartilage which bears the ventral fins, laid across the spine in its proper situation; u, u, the rays of the fin which more particularly resemble, in their figure and mode of articulation, the digit of other animals; v, v, the smaller rays of the same fins. The rays of the other fins, having no peculiarity of structure, are indicated by their position.

Fig. 2. of Plate XIII. exhibits a view of the articular surface of one of the dorsal vertebrae of the thornyback; a, the body of the vertebra; b, the canal for lodging the medulla spinalis; c, the spino- nus processes; d, the concavity opposed to that of the adjoining vertebrae; e, the perforation in the centre of the vertebra, by which the inter-articular cavities communicate with each other.

Muciles.

The muciles which move the jaws of fishes are commonly large, and calculated for powerful and extensive action. They are more numerous and complicated in the cartilaginous than the osseous fishes. We shall first describe them in the ray genus.

The principal depressor of the posterior jaw is a single, flat, square muscle, which arises from the transverse bar that is analogous to clavicles, and is inserted into the posterior margin of the jaw. Cuvier also describes two small muciles, one on each side of that just mentioned, which contribute to the depression of the jaw: they arise from the transverse bar and the skin, and are inserted near the commissure of the lips. These three muciles retract the mouth, as well as depress the lower jaw.

Three muciles close the jaws: the first arises from the external part of the base of the cranium; it passes over the superior jaw, and is lost in the aponeurosis which covers the principal muscle, at the external part of the mouth. The second muscle is a thinner flip; it arises from the fore-part of the lower jaw, passes in a circular manner round the angles of the mouth, somewhat like the orbicularis oris; then over the upper jaw, to the superior part of the end of which it is inserted. The third of these muciles brings the jaws forwards on the head, as well as of flutting them. The third muscle is a large round-shaped muscle, which encircles the articulation and the ends of the two jaws: it appears externally like one muscle, but consists internally of three parts; one is inserted into the ring-like processes at the end of the lower jaw; another into the external parts of both jaws, at their joint; and the third passes round the upper jaw, and is inserted by a tendon into the cruci-ligament which goes to the lower jaw.

There are two very long muciles which come from the spine, and pass between the palate and the cranium, in order to be inserted into the superior jaw. These serve to bring the mouth forwards, as both jaws, from their connection with each other and the neighbouring parts, are protruded and retracted together.

A pair of very thick muscles arise from each side of the sternum; their fibres are divided obliquely forwards and outwards, and unite upon a strong tendon, which is inserted into the inferior extremity of the articular cartilage that sustains the jaw. They draw that extremity backwards and inwards and consequently enlarge the angle this cartilage forms anteriorly with the base of the cranium: they carry both jaws downwards, and by bringing their extremities nearer to each other, thrust out or protrude the middle parts of the mouth. These muscles likewise maintain the articular cartilages in the above-mentioned position, and furnish fixed points for the jaws to move upon, when they are projected from the head.

Two other muscles, which are small, commence by tendon from the middle of the articular cartilage; proceed backwards, inwards, and downwards, in order to spread their fleasy fibres on the aponeuroses behind the lower jaw. They assist the preceding muscles in bringing the articular cartilage inwards and downwards.

The muciles of the jaws in the fish (squalus) resemble those of the ray genus.

In the sturgeon (acipenser flavio) the muscles for protruding and retracting the jaws are very simple. The one which brings the mouth forwards comes from behind the eye: it is very strong, and passes backwards to be attached to the articular cartilage. The retractor is a much smaller muscle: it is situated between the cranium and the superior part of the articular cartilage.

The other muciles of the jaws of the sturgeon resemble those of the ray and shark genera.

The muciles of the jaws in the genera belton, tetraodon, diodon, and stenias, are described by Cuvier as having a complicated action. The bones of the face are extremely prolonged in these fishes, in order to form a prominent muzzle, at the extremity of which the two jaws are placed, and perform their movements.

One muscle, which fills the superior part of the fossa on the side of the muzzle, arises from a ligament which complete
pletes the anterior border of the orbit; its flabby fibers, in
passing from behind forwards, terminate in part upon the
posterior border of the descending branch of the superior
jaw, but are chiefly lost on a tendon which surrounds the
extremity of that branch, and proceeds to the lower jaw,
on which it is inserted above the articulation. This muscle
moves the two jaws in opposite directions, and approximates
the one to the other. In drawing backwards and upwards
the extremity of the descending branch of the superior jaw,
it depresses the portion of that jaw which is beyond the
point of support. The same muscle likewise raises the lower
jaw.

A second muscle fills the inferior portion of the fossa that
is on the side of the muzzle, from the surface of which its
fibers arise: they proceed obliquely forwards and inwards to
an aponeurosis, which extends along the internal edge of
the fossa, and of which the extremity goes to be affixed to
the internal surface of the lower jaw. This muscle has the
same action as the first.

The preceding muscle covers a third, which is smaller.
It arises likewise from the surface of the fossa, and sends a
flabby tendon near to the posterior edge of the descending
branch of the superior jaw. This muscle co-operates with
the two others.

The inferior jaw is depressed, in the families, by three
muscles. The first is a single muscle, which is analogous to
the mylo-hyoides: it arises from the side of the hyoides,
between the rays of the operculum, and is inserted into the
inferior border of the lower jaw; the fibers converge, and go
forwards to be inserted into the inferior edge of the lower
jaw. The next two muscles are small: they arise from a
fossa under the orbit; their tendons are inserted into the
posterior edge of a cartilaginous plate, which is connected to
the base of the cranium, behind the articular bone. This
plate is attached to a long cartilaginous filament, which
advances on the side of the articular bone or cartilage, as
far as the inferior and internal part of the lower jaw. In draw-
ing the plate upwards and backwards, these muscles also
bring the filament backwards, and thus depress the lower
jaw.

The moon fish (tetraodon mola) has three muscles, similar
to those last described, and a second cartilaginous plate.
In the genus holyear there is a muscle which serves to
elevate and draw backwards the piece analogous to the
articular bones; it arises from the lower edge of the vomer,
or the vault of the palate, and descends obliquely forwards
to be inserted into the upper edge of that piece.

In other fishes, the lower jaw is depressed by a long
flabby muscle, but which, nevertheless, from its attach-
ments and use, must be considered analogous to the
mylo-hyoides: it arises from both sides of the os hyoides
and rays of the gill-cover, in two broad, thin, flabby slips; these
unite under the throat, and are inserted at the symphyses
of the lower jaw; it spreads the membrane of the gill-cover
when the jaw is fixed.

The lower jaws are elevated by two very strong portions
of muscle, which in a degree overlap and intermix with each
other; they occupy all the space corresponding to the
articular bone, from which, and from the cranium at the
back of the orbit, they arise. The two portions, which
Cuvier considers as but one muscle, are inserted into the
coronal processes of the lower jaw, into the ligament which
passes from one jaw to the other, and in some fishes we
have observed into a ligament which goes forwards to the
inter-maxillary bones: besides, therefore, raising the lower
jaw, these muscles depress the superior maxillary bones,
and depress and retract the inter-maxillary bones, which form
the superior margin of the mouth, or what is called the
upper lip in fishes.

Cuvier describes in the 
*muraena anguilla* two layers
of muscle which lie under the preceding, and are nearly
inserted into the same point of the lower jaw: they arise
from the orbita fossae. He detected similar muscles in the
carp, but did not find them in the 
viper (goyx loris), the
trouth (salmo feris), or the salmone (salmo salar); we have not
observed them in any other fish.

There is a small muscle which is attached to almost
the whole of the internal surface of the side of the lower jaw,
and covers the ventricle which exists in the maxillary bone: it
furnishes a strong tendon, which is fixed internally to the
lower and anterior part of the articular bone; it affords
the other muscles in raising the lower jaw, but if the
mouth be previously opened widely, it serves to have the
power of keeping the lower jaw in the depressed position.

The articular bone is moved by two muscles on each side:
one arises from the cranium at the back and upper
part of the orbit; its fibers pass obliquely downwards
and forwards, and are affixed upon the external surface of
the thin part of the articular bone, near its upper edge:
the effect of its action is to elevate the articular bone
and bring them outwards, by which the capacity of the mouth
is increased, and the jaws retracted. The other muscle
arises from the vomer, membranous septum of the orbit,
and the middle line of the cranium: its fibers descend in a
direct manner to the upper part of the thin portion of the
articular bone. which it has the power of bringing inwards,
and thereby abridges the cavity of the mouth, and protrudes
the jaws.

Cuvier describes two muscles in the carp (cyprinus carpio),
intended to retract the lips in this species, which has the
bones of the face formed for carrying the mouth farther
forwards than other fishes. The first of these muscles is
shorter than the second; it arises partly from the anterior
extremity of the articular bone, and in part from the poste-
rior end of the maxillary bone: it ascends a little obliquely
to be inserted into the most elevated point of the inter-
maxillary bone by a slender round tendon, which crosses
the tendon of the next muscle. The second retractor of the
lip is much larger than the preceding: it is situated
nearly horizontally, in the space comprised between the
inferior edge of the orbit, and the concavity of the arti-
cular bone, from which it arises; it is inserted by a long
flat tendon to the middle and posterior processes of the inter-
maxillary bone, which it draws directly backwards.

From the preceding description it will be perceived,
that in addition to the motions of the jaws, by which the
mouth is shut and opened, they are also insensible to
projection and retraction, and that the cavity of the mouth
is altered with respect to its width or its length in the
performance of these motions. These effects are not only
convenient to fishes in the act of taking their food, but are
necessary also for conveying it into the oesophagus. The
muscles, however, most immediately concerned in de-
stitution, are those which move the branchial arches and
pharyngeal bones, as will appear when these muscles come to
be described.

The tongue of fishes scarcely appears to perform any
motions distinct from the other parts of the mouth.
Cuvier, it is true, has described two muscles on the tongue
of the *conger (muraena conger)*, which are analogous to the
mylo-hyoides; they arise from the extremities of the os hyoides,
and go forwards upon each side of the lingual bone, to
which they are inserted: if these muscles act in conjunction
they depress the tongue, but, if separately, the tongue is
drawn
drawn to either side. Cuvier likewise states that the tongue of the conger is contracted in its breadth by some transverse fibres, which pass from the edges to the middle part; we have not observed any muscles for moving the tongue in those species we have dissected, but we have often seen tendinous fibres pass from the os hyoidei to the sides of the lingual bone.

The muscles intended to move the branchial arches and the pterygoid bones in offium fishes are too numerous and complicated, that we almost despair of giving the reader a clear conception of them. They may be divided into three sets or orders, besides some distinct muscles; the first is composed of a cluster of muscles, which connect the superior ends or abutments of the branchial arches, and the inferior pterygoid bones to the bony sides of the cranium. The second set consists of a few muscles placed over the joints of the inferior ends of the arches, and the inferior pterygoid bones, with the intermediate bones that are connected to the lingual bone; the third set is made by muscles which surround the posterior side of the last branchial arch, the pterygoid bones, and the origin of the esophagus.

In the first set there are seven muscles; all these, except one, are attached from the side of the head, immediately beyond the orbit, at the joint of the articular bone.

The first muscle comes from the common origin already mentioned, and is inserted into the posterior side of the base of the short branch of the first branchial arch; it bends the joint of the arch, and brings the whole arch forwards.

The second arises from the same point, and goes to be attached to the posterior side of the short branch of the second branchial arch. It has the same effect as the preceding.

The third muscle arises from the base of the cranium, between the articulations of the scapula and articular bone, and is inserted into the posterior edge of the short branch of the last branchial arch. It elevates the last arch, and thereby affilts in opening the esophagus.

The fourth comes from the common point of attachment, and terminates upon the footstalk of the three half branchial arches, and the small anterior pterygoid bone; it tends to draw these bones outwards, and thus dilate the opening into the esophagus.

The fifth muscle arises with the others, and proceeds to be affixed to the external edge of the principal pterygoid bone. Its operation is similar to that of the last mentioned muscle.

The sixth arises from the common footstalk of the three last arches, and goes on to the external edge of the short branch of the second arch near its base. It contracts the arches, by binding the joint at the concavity of the arch, and that at the footstalk; it therefore tends to close the gills.

The seventh muscle has the same origin as the preceding; it is a stronger muscle, and is spread equally upon the anterior surfaces of the two last branchial arches; it concurs to produce the effect ascribed to the last mentioned muscle.

The second set of branchial muscles is made up of four pairs, or eight slips on each side; four of these are longer than the others, and situated more obliquely and superficially.

The first arises from the ligament which connects the conjoined processes of the two posterior arches to the lower end of the first intermediate bone; it proceeds obliquely backwards, and is affixed to the inferior end or abutment of the second branchial arch. The next three arise together from the conjoined processes of the two last arches already mentioned. One goes to be implanted into the inferior end of the third branchial arch, the next is inserted into the fourth branchial arch, and the fourth lies in the interior pterygoid bone.

The four other muscles of this set are short, lie in an obliquely transverse direction, and are in a great measure concealed by the preceding muscles; they are extended from the inferior ends of the branchial arches to the adjoining parts of the intermediate bones.

The effect of the action of each of these muscles is the same; they all tend to depress the lower part of the mouth, if the branchial arches be rendered fixed; and if not, they separate the arches from each other, and lower them, thus opening the gills, and widening the aperture of the esophagus.

The circle which is made round the entrance into the esophagus by the last branchial arches and the pterygoid bones of each side, has on its posterior surface a chain of small muscles.

The two first arise from the junction of the footstalks of the inferior pterygoid bones, and are inserted into the most external points of these bones. They approximate the pterygoid bones, and bring them downwards.

The next pair arise from the outside of the termination of the preceding muscles, and are inserted near the middle of the posterior surface of the last arch. They approximate the two last arches by means of their connection with the inferior pterygoid bones.

The third pair of muscles are extended across the joint of the last arches, and consequently, when they act, bring the branches of the arches together.

The fourth muscles arise from the footstalks of the superior pterygoid bones, and are inserted into the points of the inferior abutments of the last arches. They make these abutments approach the superior pterygoid bones, by which the arch is closed.

Besides these four pairs, there are four slips of muscle, which pass from the pterygoid bones of one side to the other. The muscle connecting the superior pterygoid bones is very strong. These complete the circle, and diminish it by approximating these bones.

There are further, a number of muscular fasciculi surrounding the orifice of the esophagus in the manner of a sphincter. These fasciculi are thrown up upon the sides, where they have also nearly a straight direction, by which they have the effect of contracting the joint of the last arch. There are likewise some fibres extended from the muscle that lies between the superior pterygoid bones, to the sphincter of the esophagus.

When all the muscles of this set co-operate, the opening into the esophagus is abridged; or, if the animal wilt it, entirely closed; from the connection between the last arch and the others, they are all brought close together, and the dentilated surfaces of the inside of the arches, and of the pterygoid bones, are made to approach near, as to prevent the escape of the prey which the fish may be in the act of swallowing.

There are four distinct and remarkable muscles on each side, which are materially concerned in the motions of the gills and pharynx.

The first are very thick and massy: they take their origin from the anterior edge of nearly the lower half of the saeula, and are inserted upon the sides of the broad, thin, heart-shaped bone which is situated under the throat of the fish. By means of the connection of this bone with the hyoid
Fish.

Hyoid branches, intermediate bones, &c. Those muscles will open the pharynx, by depressing the tongue and branchial arches. If these parts, however, be kept fixed, they will bring the pectoral member forwards; they will also depress the lower jaw, in consequence of the connection the heart-shaped bone has with that part. Cuvier considers these muscles as analogous to the _flessoHolotii._

The second muscles arise on each side from the anterior edge of the scapula, opposite to the middle of the muscles raising the pectoral fins. They are thin slips; they pass through the substance of the muscles last described, and go to be inserted in the lowest part of the inferior pharyngeal bone. They depress the branchial arches, and thereby widen the pharynx.

The third pair of muscles arise by a small tendon from the anterior part of the scapula, opposite to the articulation of the clavicle with that bone, and proceed for some way before they reach the point of their insertion, which is the lowest part of junction of the inferior pharyngeal bones. They draw the pharyngeal bones downwards and backwards, and thereby contribute, with those last described, to open the pharynx, and render it of a round shape.

The fourth muscles arise from the second vertebra from the head, diverging a little in their course, as they proceed a considerable way forward, and are attached to the inside of the superior pharyngeal bones. They have the power of retracting these bones, and thus co-operate with the other muscles which dilate the entrance into the eosophagus. They likewise turn the superior pharyngeal bones, so as to oppose to each other their rough or denticulated surfaces. These muscles are strong, and remarkable also on account of their length: they arise as far back, in the subscapula (glandus meralangi), as the fifth vertebra from the cranium.

The preceding description of the branchial and pharyngeal muscles contains what we have observed in the _dogus (caus faber)._ The structure of other effuse fishes, in this respect, does not appear to be materially different. In some of them, the bundle of muscles, by which the branchial arches and the pharyngeal bones are supported to the cranium, is composed of a fewer number; and those for contracting the passage into the eosophagus are less distinct and strong. The most remarkable variation is met with in the _carp (cyprinus carpio),_ in which the pharyngeal bones are constructed for breaking and dividing the food. In this fish, the inferior pharyngeal bones are not, as usual, attached to the last branchial arches, but are elevated behind these near to the cranium, to which they are supported by a number of muscles, of which Cuvier has given the following description.

There are first two exceedingly strong muscles attached to the sides of the base of the cranium, behind the adductor of the operculum, and inserted into the superior extremity of these bones. They elevate the bones, and draw them a little outwards.

Two other muscles arise from the external angle of the glenoid cavity, which receives the superior pharyngeal bone, and go to be inserted along with the first muscles. They bring the superior extremity of the pharyngeal bone inwards.

Two strong muscles are affixed by their anterior extremity to the middle part of the pharyngeal bones, and proceed obliquely backwards and inwards to be inserted into the occipital apophysis. They draw the pharyngeal bones backwards.

The pharyngeal bones are supported by a very strong single muscle, which Cuvier, both from considering its structure and use, calls the _digastric adductor._ The two bellies of which it is composed arise from the middle part of each of these bones, and are inserted into a common tendon, placed in the interval of the anterior portion of those bones, and is there connected to the spongy fibres which fill up that interval, affixed by some transverse fibres of the pharynx, which go from one pharyngeal bone to the other. This muscle is able to approximate the bones with much force, and to urge their teeth against the superior plate. The operation of these muscles belongs rather to the functions of mastication and deglutition than to those of the gills.

Two strong muscles arise from the internal surface of the scapula, and are inserted by a very strong tendon to the anterior extremity of the pharyngeal bones. They bring the scapula forwards and inwards; or if it be fixed, they bring the two pharyngeal bones at the same time backwards and downwards.

Two other muscles, attached at one part to the inferior side of the anterior part of the pharyngeal bones, and at the other to the internal surface of the scapula, may likewise approximate the inferior extremities of the scapula from the middle line; but they can more easily separate the pharyngeal bones the one from the other.

Finally, there are two long slender muscles, which are extended from the inferior and anterior extremity of the pharyngeal bones to a process, which corresponds to the intermediate bone of the last arch. These bring the pharyngeal bones forwards.

The branchial muscles in the _frondemorphynx_, and, as it would appear, in all the fishes with _fixed branchia_, are few and simply arranged. The cluster of muscles which connects the branchiæ with the head, and the small muscles which go from the branchial arches to the intermediate bone, do not exist in these fishes.

The flender muscles which go from the clavicle to the archæ, in effuse fishes, are supplied in the _rays_ by two very strong muscles, which arise posteriorly by two thick tendons from the transverse cartilage, and proceed obliquely forwards and inwards, under the middle cartilage of the branchiæ, into which they are inserted. In drawing this cartilage downwards and backwards, they open all the branchial arches.

There are other muscles constructed to open and shut the branchiæ, which are peculiar to the _rays_ and _shark_ kind.

Between the anterior bones of the rami and the rays of the branchiæ, a muscle is found, the fibres of which seem to separate on each side from the middle ray, being directed towards the others, but particularly towards their extremity, so that the effect of their action is to approximate the extremities of the rays, and consequently to separate and open the two ends of the arch. The action of this muscle is limited by several ligaments, which go from the base of the ray, nearest the extremity of the arch, towards the extremity of the succeeding ray.

This arch is closed by another muscle, which is short, thick, and cylindrical. It is situated transversely on the angle that is formed by the two pieces of the arch, where there are three ligaments of some depth, in which the two extremities of the muscle are implanted.

There is further, in these genera, a very strong muscle, which envelopes the gills, covering every part of them except that next the mouth; it has the effect of compressing or approximating the whole at once. The fibres are parallel, and have an oblique direction from before backwards. Five tendinous intercurrences are to be seen, which correspond to the external surface of the muscles already described.
which lie between the laminae and rays of the branchio-
which lie between the laminae and rays of the branchio-
type of muscle has the effect of
between two muscles; the one upon the external, and the
the other upon the internal side. These are analogous to the
mucular fæce of the ray and shark kind.

The operculum of the gills in _officous_ fishes is raised by one
pair of muscles, and brought down upon the branchial apert-
ure by two muscles on each side, and one common to both

The elevator or adductor of the operculum arises from the
external part of the bale of the cranium, at the root or joint
of the articular bone: it is a short, taper muscle, and is in-
ferred into the head of the triangular bone of the gill-cover,
which is joined to the articular bone. This muscle acts
under the disadvantage of being infixed as far as possible
from the edge of the bone that is to be raised: it must,
however, be aided in producing its effects by the elevation
of the articular bone.

The two muscles which flunt the operculum are described
by Cuvier as only one: they arise from the bale of the cra-
nium, almost immediately behind the preceding muscle, and
which they form a thicker mass; they are inserted into the
neck, or anterior part of the superior edge of the triangular
bone.

The common muscle is attached internally to the rays and
offensive plates of each gill-cover, between which the fibres
cross from one side to the other. The effects of this muscle's
motion are the approximation of the rays and the shuttling
down of both operculae.

The rays of the gill-covers are expanded, and the mem-
brane branchiolygrous and spread out, by the mylo-
yoideus muscle which is attached to the offensive rays, and
by a muscle composed of two portions, which Cuvier de-
scribes as being particularly plain in the _tent_ (falmo fario):
one portion arises from the lower edge of the posterior part
of the os hyoideus; the other arises from the internal surface
of the five anterior rays, and is attached to the other rays by
long tendinous filaments. Both portions unite in one ten-
don, which passes under the anterior extremity of the oppo-
site branch of the hyoideus, and is expanded under the lingual
bone.

Besides these muscles, the _moon-fish_ (tetraodon sola) has
the operculum itself composed of several muscles. The
principal one, which forms almost the whole of the operculum,

The very limited motions of the head, upon the spine of
officous fishes, are effected chiefly by the great lateral muscles;

The principal elevator of the head is a long small muscle,
which arises from the base of the shoulder, on the top of the
cartilage which corresponds to the scapula, and the adjoin-
ing transverse procés of the cervical spine: it tends a long
tendon through a pulley on the side of the eye, which is
left in the anterior part of the font.

On the lower part of the head there is a pair of muscles,
similar to those for raising the head: they arise from the
transverse cartilage, analogous to clavicles and flerrum, at
which place the muscle of each side is united; they proceed
forwards on each side of the mouth, and furnish tendons
which pass in the gelatinous substance of the face, at the
anterior extremity of which they terminate. These muscles
deprive the head. Cuvier gives a somewhat different de-
scription than we have given of the foregoing muscle.

A third pair of muscles arise from the spinal column, and
the anterior portion of the arch which furnishes the large
wings, and are inserted into the posterior extremity of the head.

The main muscles, except in the flat chondropterygis, are
the most remarkable in the fish's body, whether we view
them with respect to their bulk or their structure.

These muscles are analogous to those which lie along the
spine of other animals; but, from the form of the skeleton in
fishes, they are situated upon the sides of the body, and have
sequently received the name of _lateral muscles._

The face of the lateral or spinal muscles exceeds, in an ex-
traordinary proportion, that of all the other muscles of a
fish; they make the principal bulk of the animal, as they
constitute, with the fijtuous fabric which fills them, al-
most the whole of the organs of motion.

It is a most impossible to convey a clear idea of the com-
position of these muscles by description alone, it is to ex-
tremely complicated, and to different from the ordinary
structure of the muscles in other animals.

The great spinal muscles of fishes in general consist of
three portions, which, from their situation, deserve to be dif-
tinguished into the _superior_ or dorso-lateral, the _middle_ or _vertebral_,
and the _inferior_ or _undervisal_, portions.

The muscular fibres of which each of these muscles is
composed, are formed into successive _layers or rows_, by
means of the interpolation of thin aponeuroses. These
muscular interpositions merely exhibit, on the external sur-
face of the lateral muscles, the appearance of lines placed
at short and determined distances from each other, and
thus subdividing each portion into a number of regular
compartments. The subdivisions or compartments have dif-
frent forms or directions in each portion, which will be after-
wards pointed out. The short rows of muscle that fill up
the compartments appear, when viewed upon the external
surface, to be all arranged in a longitudinal direction, or to
follow one another in the line of the fish's body; but if ac-
curately examined, they will be found to consist of flakes or
pieces of muscle, which partake of the figure of a wedge and
the bow of a spoon, being thick at one edge and thin at
the other, and concave on one side and convex on the other.
The figure of the flakes is well exhibited by the application
of heat, particularly in the genus _gadus_; in cooking the
 MacBook Air
The interflections of the ventral portions of the lateral muscle describe very faint curves on the fore part of the body, at which place they are, rather indistinct, but towards the tail they form V-shaped lines, which come gradually closer to each other, until at length they compose parallel tendons, in the same manner as the connected vertebral and dorsal portions.

This portion of the lateral muscles, besides being a powerful flexor of the tail, compresses the ventral and branchial cavities, and is therefore analogous to the intercostal and abdominal muscles of other animals.

The preceding description is taken from the 'Dory (zatus falter); a fish which has the lateral muscles particularly distinct and strong. In the other species we have described, we have found the structure to be similar, that the 'dory may be given as a general example of the class.

In some of the flatfish (Pleuronectes) the ventral portion of the lateral muscle appears to be double, or to be composed of two parts which join each other in the line of the angle of the interflections, and therefore correspond to the dorsal and vertebral portions. Mr. Carlisle, in the Croadian Lecture for 1805, describes the ventral portions as being always of two masses, which he calls the ventral and abdominal feathers.

In the 'mackerel (Scomber scombrus), the 'burring (Alypea harengus), and some others, we have observed a layer of muscle of a dark colour, extended along the middle line of the body; if this layer be cut transversely, it exhibits the figure of a compressed triangle. It is lodged in a corresponding vacancy, which is formed along the junction of the other portions of the lateral muscle over the spine of the fish: this long stripe of muscle has probably no peculiar action, as the interflections of the adjoining parts are continued through it in the same direction as in other fishes.

The lateral muscles of the genus 'effusion differ in some circumstances from those of other fishes. As the 'effusions have the body rendered immovable by being inclosed in a hard horny shell or case, these muscles are not connected to the spine, but to the head and the tail only. Their structure also is not so complicated as in other instances, their fibres being principally longitudinal.

The internal surface of the case of the 'effusion is lined with an aponurocytous only.

Cuvier describes an additional pair of muscles that are peculiar to the tail of these fishes; they are of a pyramidal figure; they arise from the inner side of the case, on the lower or abdominal side of the body, and are inserted by small tendons into the inferior part of the side of the last caudal vertebra. They carry the tail to either side, and departs.

The motion of swimming consists almost entirely in the flexion and subsequent extension of the spine of fishes; in the production of both which effects, the lateral muscles are the sole agents, by one line or part acting alternately, or in opposition with another. The peculiar composition and arrangement of these muscles are designed to bring extraordinary power and velocity of action, combined with a limited operation as to extent and duration. The weight of the column of water displaced by every impulse of a fish, during the act of swimming, and the celerity with which some species move through water, not even exceeded by that of the flight of birds, has to rare a mechanism as to prove the power and rapid operation of the spinal muscles, while the limited capacity of flexion of the tail of fishes, and the exhaustion these animals experience when their muscular efforts are protracted, show that the spinal muscles are incapable
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Pable of an extensive or long continued action. Mr. Carllide has very ingeniously attributed the physiological properties of the lateral muscles to the arrangement of their fibres, and the minute ramifications of their blood-vessels, which do not admit the red particles; and he contrails this structure, and the kind of muscular power consequent upon it, with the organization and functions of the muscles of tardigrade animals. See Phil. Trans. part 1. 1826.

It has been already observed that the spinal muscles of the flat chondropterygii, or the ray genus, are excepted from the description of the general structure of these parts in other fishes. They are formed more upon the plan of the muscles of the tail of certain quadrupeds, than like those of their own class.

Cuvier describes the lateral muscles of the ray genus as being composed of two layers, and each layer consisting of two muscles. As we have not particularly described them, we shall adopt his description.

The superior lateral muscles arise from the middle of the vertebral column above the abdomen, by a flabby head, covered with strong apaneuroves: this portion extends as far as the pelvis, and then detaches itself to form branches, which pass through parallel sheaths, and proceed successively towards the middle line, where they are inserted into the upper part of each of the vertebrae of the tail. Flabby fibres accompany these tendons to some distance, after their separation from the common fascicule.

In the inferior part of the tail the superior lateral muscles receive accessory fibres from each side, but these are simple tendons, which seem only intended to guard against two violent an extension, either to one side or the other.

Each tendon of the superior lateral muscles pulls the vertebrae of the tail, to which it is attached, in the direction of its own action, and the flexion, or general curvature of the tail upwards, is the result of their common contraction.

The inferior lateral muscles arise also from the lumbar vertebrae, like the preceding, but more externally. Their arrangement also is similar, with this difference, that their tendons make a kind of turn, and run under the tail, where they are inserted into each of the vertebrae. They also receive accessory tendons. They produce motions in an opposite direction to those of the superior muscles, that is to say, they bend the tail downwards. Their tendons are more slender than those of the former. They divide into two branches at their extremities, and each bifurcation affords a passage for that of the next vertebra, so that they mutually serve as sheaths; and are all, except the last, both perforating and perforated.

The spinal muscles consist of flake, and are pale, as in the officious fishes, although their form is different in this genus.

The dorsal, anal, and caudal fins are moved by a great number of small muscles. In the interval left between the dorsal portions of the lateral muscles, along the back, there are found some long flender muscles, extended from the neck to the first ray of the dorsal fin, and between the dorsal fins, where there exist more than one, and from the dorsal to the caudal fin. By means of the infection of these muscles into the first ray of each of the fins they tend to raise and spread them.

The number of these muscles varies according to the excellence or number of the dorsal fin. In the gymnotus, and some others which want the dorsal fin, there is only a single pair, which extends from the neck to the caudal fin. In the species which possess one dorsal fin, there are two pairs, and in those that have two dorsal fins there are three pairs.

There are muscles corresponding to the above, placed upon the lower or inter-articular edge of the fins, intended for the expansion of the anal and caudal fins. Cuvier describes two pairs of these in the carp (Cyprinus carpio). The one arises from the junction of the bones which sustain the pectoral fins, and is inserted on each side into the ligamentous suture which unites the two ventral fins; the other arises, of this pair of muscles is composed, are four or five in number, in form resembling beads, and placed at some distance from each other.

The other pair extend from the anal fins to the first rays of the caudal fin. These flender portions are still thinner, and their tendons much longer than those of the former pair.

The other motions of the dorsoal and anal fins are accomplished by means of a number of slender muscles, resembling in their form and position the intercosti of the hand. They lie upon the spines, which are added to the spines procured the dorsal and caudal vertebrae, for the purpose of sustaining the dorsoal and anal fins. There are two sets or series of these muscles, a superficial and a deep-seated; the first arises from an apaneurose which lies the skin, and furnishes fepta to form a sort of sheath to each of these muscles, and which, by adhering along the roots of the additional vertebral spines, makes a degree of sheath also for the free margins of the lateral muscles; these muscles are inserted into the bastes of each of the rudi of the fins. The immediate effect of their action is to bend the rays of the fin laterally, if those of one side only are employed; but, if both sides act, the rays are brought closer to the body; if already inclined that way, but if standing in a right angle with the body, these muscles may serve to sustain them, or keep them fixed in that position.

The second set lie under the preceding muscles, and are enclosed in the same sheath with them; they are each attached to two of all the inter-articular spines bones for almost their whole length, and at their roots to the inter-muscular sponaeurose, already mentioned: their tendons are inserted into the sides of the bastes of each ray, by which means they draw the rays of the fin out of a right line, and thus tend to expand the fins as well as bring them to either side of the body.

Cuvier describes a sort of short oblique muscles for closing the rays of the fin, which we have not seen except on the caudal fins.

The flexion of the caudal fins is effected at the same time with that of the whole tail, by means of the great lateral muscles already described; but the rays of the caudal fin are expanded and contracted by particular muscles for the purpose.

Those that spread the caudal fin are concealed by the lateral muscles; they arise from some of the last vertebrae, spread in a fan-like manner, and are inserted into the roots of the rays; the outermost fascicule come from the three vertebra preceding the last, and terminate upon the five or six of the external or longest rays; those of the intermediate rays arise from the two last vertebrae.

The muscles which serve to approximate the rays of the caudal fin appear like a row of beads or barley-corns, lying obliquely upon the joints of the rays and inter-articular bones, with the broad, thin termination of the last vertebra. These muscles of one side of the tail appear to pass in a different direction from those of the other side, or to decussate each other.

The single fins are evidently intended to increase the lateral
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The fins of fishes, during the act of swimming, and thereby communicate a greater impulse to the water. They are also useful in turning the fish, and particularly the caudal fin must act like the helm of a ship. Mr. Carville made the experiment of cutting off the different fins of living fishes in succession, with the view of determining their separate offices; he observed, that after the removal of the single fins there was an evident tendency in the fish to turn round, and the pectoral fins were kept constantly extended to obviate that motion.

The single fins may also be considered as instruments of defence to fishes, more especially when the rays of the dorsal fins terminate in sharp spines, which they do in a great number of species, and in those cases the muscles for erecting the rays are particularly strong.

In offious fishes, the great lateral muscles supply the place of the abdominal muscles, as well as those which arise from the spine; but in the ray genus we find some muscles, which correspond a good deal with the abdominal muscles. The inferior parietes of the abdomen in those fishes are composed of some layers of muscles which are attached to the transverse cartilages and the posterior branches of the scapula; and to the pieces composing the pelvis; these fibres take a similar direction to that of the straight and oblique muscles of the belly, and those of each side are distinguished by an aponeurotic line, analogous to the linea alba. They tend to depress the wings, and bring the pelvis forwards and downwards.

The inferior parietes of the abdomen are formed by two thin, broad muscles; one arises from the aponeurosis, under the skin of the back, and is inserted into the back of the posterior branch of the scapula; the other arises from the aponeurosis of the muscles of the dorsal spine, and the back of the pelvis, and is inserted along the middle of the posterior branch of the scapula; these muscles are concerned in the elevation of the wings.

The muscles of the pectoral fin are simple in both the cartilaginous and the offious fishes.

In the offious fishes there is, in some species, a small, short muscle, situated on the internal and back part of the portion of the scapula, where that bone is connected to the cranium. It has the effect of bringing the scapula closer to the head.

There is likewise a small tensor muscle which arises from the front of the clavicle, and is inserted into the posterior flank of the scapula; it brings the scapula backwards, and the clavicle forwards and inwards.

There are two sets of muscles situated upon the broad and thin portion of the scapula for moving the rays of the pectoral fin. The external set consists of three muscles, two of these are partially covered by the other; the two uppermost may be divided into a great number of fasciculi, which send tendons to the bases of the rays of the fin; the most inferior of the external set sends tendons only to some of the most inferior or external rays of the fin. The internal set consists of two muscles much resembling the two first that are placed externally; they send tendons into the roots of the rays on the inside. By all these muscles the rays of the fin are raised from the body and brought closer to it; turned forwards, and the edge presented to the water.

In the genus ray, besides the muscles already mentioned in describing other parts, which act upon the pectoral members, there is a very short muscle which goes from the lat transverse process of the cervical spine to the top of the shoulder; it appears to raise the scapula. There is also a muscle extended along the concave side of the posterior branch of the scapula; its fibres arise from a tendon which is stretched from above the joint to the point of that branch; they are inserted into the edge of the fin. The use of this last appears to be to bring the posterior branch of the scapula nearer the body; this motion is attended with the expansion of the rays of the fin.

The muscles which act immediately upon the rays of the wings in the flat chondropterygi are as numerous as the rays themselves; they altogether compose two great layers of fasciculi, somewhat resembling the muscles of the single fins of offious fishes; one layer is placed upon the superior surface of the wings, the other upon the inferior; they thus cover the whole fin, arising from the external side of the scapula, and extended to almost the very edge of the fin.

Their office is to raise and depress the wings.

The muscles which move the rays of the ventral fin in offious fishes are situated upon the external and internal surfaces of the pelvic bones. On the external surface there are three or more fasciculi, which in approaching the bases of the rays form lesser fasciculi, one of which is inserted into each ray; the external muscles elevate the fin, and from their oblique direction and mode of attachment they also tend to close the rays. There is but one muscle usually on the internal surface of the pelvic bone; with its fellow, it fills up all the space left between the two flat surfaces of the bones of the pelvis. These muscles have the effect of depressing the rays of the ventral fin, and at the same time of expanding them, so as to present a broader surface to the water.

In the chondropterygi the external rays of the ventral fin, more especially the outermost, have their muscles in distinct fasciculi, which are capable of drawing the rays in all directions. These muscles might be compared with those that act upon the lower extremities of mammals: the small rays of the ventral fins have fasciculi closely applied to them in the same manner as those of the pectoral fin in these fishes.

The chief uses of the pectoral and ventral fins are to turn and flip in swimming, and to preserve the position of the fish; therefore we observe, they are always employed when the animal wishes to continue nearly in one place. When the motion of the fish also is very gradual through the water these fins are sometimes the only instrument employed in swimming. From the experiments made by Mr. Carville of cutting off the fins in a living fish, it would appear that the pectoral fins are useful in ascending, and that they serve to keep the head uppermost; when both the pectoral and abdominal fins were removed, he found that the fish had a tendency to roll and could not ascend at all.

Air Bladder.

This singular organ is peculiar to the class of fishes. Anatomists have ascribed various functions to it; we have, however, chosen to place it amongst the instruments of motion, for reasons which will be given hereafter.

The air bag is wanting in several species of fishes, and has been supposed to be absent in some others, in which it really exists. It is not met with in one of the chondropterygi, in the genus lophius, in the men men ray ( traumatic mole); it is supposed to be wanting in the ammodytes telesinus, the gnomatias farav, the callanmias draco, the blennius fraseri, and blennius vestitata. Sc.; in the genera cephal, echeneis, and eusus. It is absent in the flat fishes (pleuracotes), and in the mackerel (scomber scombrus); we have not found it in the sevus (trachurus draco). Bloch appears to have extended the list of fishes in which this organ is absent farther than is right; he denies its existence in the electricel elc (gymnotus electricus), although Mr. Hunter described it in that fish. Redi also stated it to be wanting;
in the uromophus sebae, in which Cuvier has found an air-bag resembling that of the carp (cyprinus carpio).

The air-bag is always situated upon the inferior surface of the dorsoventricle; sometimes, as in the genus gadus, it is adhered firmly and intimately to the spine. At other times, as in the genera salmo, ophis, &c., it tends to proffer to the ribs and the spaces between them.

In the dory (zeus faber) it is connected to the spine by ligaments which arise from the bag, but is not continuous with it.

In the carp (cyprinus) the anterior portion of the bag only is attached to a descending process of the second dorsal vertebra. In the salmon (acipenser huso), the el (murena), the bering (elops), and many other fishes, the bag is unconnected with the spine, and preferred in its proper position by its peritoneal coat, and the duct which communicates with the cefalaphus or stomash.

The structure of the parietes of the air-bladder is extremely curious. It has two proper coats and a peritoneal covering; the internal proper coat is in general a fine delicate membrane, which, in many cases, is not closely adherent at every part to the other coat; it appears to be double, and the innermost layer to be, in some places, looser, and capable of being moved upon the surface of the other.

The external proper coat is in many cases incomplete or wanting in some parts of the air-bag: thus, in the genus gadus there is only the membranous tunic along the upper surface of the bladder, which corresponds to the bodies of the vertebrae; the intimate connection with the external parts of the spine rendering a stronger intermixture in this place unnecessary: this coat also appears to be wanting in the posterior bladder of the carp (cyprinus carpio). It is absent also upon the posterior end of the air-bag in the dory (zeus faber), but in this instance it is supplied by a thick, sili, light-looking tunic, which has considerable strength.

The external proper coat has a most peculiar structure: it is very chiefe in its texture, resembling, when cut through, the ligamentum nuchae of mammalia; it is of a beautiful silvery white colour, and the inner surface glitters like polished metal; from these characters we should wish to give it the name of the argenteum coat: it is tough, but possesses very little elasticity, which it appears to lose entirely upon being stretched. This coat is generally thick, but does not tend to be strong in proportion; it tears with the application of a much lighter force than would be required to rupture a tendon or ligament of the same degree of thickness. Cuvier states its consistence to be so considerable in the salmon as not to shrivel when the bag is emptied of its air; it is also very strong in the genera silurus and gadus; in other instances, as in the pike, hering, etc., carp, &c., it is as thin as a membrane: in the leuciscus (polypterus niloticus) this coat exhibits some oblique fibres, which Cuvier is disposed to consider muscular; it is the argenteum coat which is so intimately united to the external parts of the vertebrae in the cod.

An opinion prevails that it is unwholesome or dangerous to cut the air bag of fishes, which probably arises from the indigestible nature of the external coat.

The cobitis joffils is distinguished by having the parietes of the air-bag composed of bone; the offensive covering appears to supply the place of the external proper coat in this fish, and is likened to the membrane.

The peritoneal coat does not always entirely cover the air-bladder; in some instances, when the latter adheres to the spine, it only passes over the inferior surface of it.

In certain fishes the air-bladder contains a remarkable vascular apparatus; this is always situated on the inner side of the inferior or abdominal parieties of the bladder, it appears to be interposed between the duplicatures of the internal proper coat of the bag, the innermost of which is extremely thin where it covers the surface of the vascular apparatus.

There is great variety in the figure of the vascular organ in the cod (gadus morhua); it is a broad patch, somewhat of a heart-shape, composed of a number of short foliated processes hanging close to each other. In the cobitis (gadus merlangus) these processes are finer, lighter, and not so close together, and look like the vascular furred membrane produced by the deposition of lymph on an inflamed surface.

In the mullet (mugil cephalus) there is a number of granular vascular bodies spread over an oval surface, about two inches long and one inch and a half broad; these are fed by an artery of some size, which, after entering the bag, sends branches to each of these little masses.

In the el and conger (murena anguilla and murena conger) there are two spherical vascular bodies placed at a little distance from each other.

In the dory (zeus faber) there are four vascular bodies, situated nearly at equal distances from each other; they are narrow, rounded upon the surface, and are composed of smaller irregular-shaped masses, which give them a granular appearance; each body is coiled or twisted like a piece of intine, and they are all connected together by the blood-vessels which pass through a hole formed in the lower parieties of the bag for the purpose, and on entering the bag branch off regularly to supply each of the vascular bodies.

In the gadus palatialis, Cuvier states that the inner surface is entirely covered with long and numerous vascular filaments.

Whatever may be the form and arrangement of the vascular bodies, they agree in one circumstance: they receive a great supply of red blood that every point is coloured, the whole appearing of an uniform crimson colour, as if it were dyed. There is no other organ of the animal body, with which we are acquainted, that possesses the same peculiarity of vascularity, except the choroid gland of the eye of fishes; but even this part falls short in the degree of vascularity.

It may be stated in a general way that in those fishes which have a distinct vascular apparatus, there is either a communication between the air-bladder and the stomach or esophagus, or the internal membrane of the bag receives a considerable number of blood-vessels. In some cases, however, when these provisions exist, the inner surface of the air-bladder is abundantly supplied with blood-vessels. In the leuciscus (polypterus niloticus), for instance, the vessels form a immaterial tangle, which colour a great part of the surface of the bag.

It has been commonly fapposed that the vascular bodies, and the vessels distributed upon the inner surface of the bladder, are designed to recreate the air with which it is filled. This fett, which has been called in question by some physiologists, is fully proved by the structure observed in the vascular bodies of elts (murena), and the fee perch (perca labrax). In the former, the vascular bodies exhibit on their surface a fine net-work of vessels containing air; and in the fee perch, besides the usual vascular body on the inner part of the bag, there are two others placed externally on each side, and extended from the base to the point of the cone-shaped bladder of this fish. These arise from these a great number of little air-vessels, which unite into several principal trunks that penetrate the parities of the bladder, and open into its cavity by thirty or forty orifices on each side, arranged in a line.
As the offices of these angular organs are so satisfactorily demonstrated, they might with propriety be called air-glands. The circumstance of the vascular bodies secreting air is a most interesting fact in physiology, and serves to explain the production of gaseous matter from the secreting furnish in other class of animals.

The communication which the air bladder has, in several fishes, with the stomach is one of the most curious circumstances in the history of this organ. It has been supposed, by some anatomists, to be intended to discharge the contents of the bag; but we are more disposed to think that it is designed to admit air, which is formed by the surface of the alimentary canal. In no instance has any fish been observed to expel air by the mouth or anus; and it is retained in the stomach, the specific gravity of the animal would remain the same, and consequently the supposed purpose would not be answered. On the other hand, the secretion of air from the surface of the stomach is a well-ascertained fact, with respect to many other animals, and may be inferred from the analogy to take place also in fishes. Another argument may be drawn from the surface of the air-bag being commonly found life vascular in those instances where this communication exists.

The duct, which serves to convey the air from the alimentary canal into the bladder, has been observed to exist in certain species of the genera acipenser, narina, perca, salmon, elops, cyprinus, cupida, flaurus, and polysternus. It varies with respect to its size and figure, and the places at which it arises and terminates. In the eel (narena anguilla), the conger (nereina conger), and the narina belua, it passes from the anterior part of the stomach to the middle of the bladder, between the two air-glands; it becomes wider as it approaches the bladder. In the pike (eops lucius), the trout (salmo fario), the salmon (salmo fario), and the flurgeon (acipenser flurum), the opening into the bag is situated near its anterior extremity. In these fishes it is short and wide, particularly in the pike and flurgeon; in the latter it is so wide, that a finger will pass through it, and so short, that it appears like a ring rather than a duct. It arises from the eolophagus in the salmon, and from the beginning of the stomach in the flurgeon. It opens into the anterior third of the bag in the narina. The duct is extremely long and small in the carp (cyprinus carpio), and passes from the termination of the eolophagus to the anterior part of the posterior portion of the air-bag. In the eerring (cupida baren- gus) the posterior or funnel-shaped extremity of the stomach gives origin to a slender duct, which enters the air-bag at about one-third from its posterior extremity.

The orifice into the eolophagus is not furnished with any valves to prevent the admission of extraneous substances; but when it is wide, it is encompassed by some muscular fibres, which perform the office of a sphincter. This structure is well seen in the flurgeon and the bichir (polysternus chilotus); in the former, the short duct has a muscular coat of circular fibres; and in the latter, the orifice is surrounded by a sphincter. When the duct is very small, the contraction of the ordinary muscular fibres of the alimentary canal seems to be adequate to the shutting of the orifice.

In whatever manner the orifice of the air-duct be constructed, its opening or closing is unquestionably regulated by the will of the animal.

Having stated the general structure of the air-bag, and the parts connected with it, we shall enumerate the peculiarities of its form which have been observed in different fishes.

The air bladder in some instances consists of two parts or chambers, communicating with each other. In the bichir (polysternus chilotus, Geoffroy), it forms two large cylindrical faces, of which the one is much longer than the other, extending the whole length of the abdomen; they only unite when they communicate with the eelophagus; the tetraodon oblongus ilho has the bag of two portions, but of different figure and magnitude; they lie together, and unite at their anterior extremity. In the gadus holbo the two portions of the bag are of unequal lengths, being parallel to each other, and are joined in their middle. In the carp (cyprinus), and the mohephorus eoker, the bag consists of two faces, the one placed behind the other, and separated by a contract, which leaves a small aperture of communication between them.

The air-bag is single in all other fishes, except the foregoing examples, and exceedingly various in its form, even in species of the same genus. It has the figure of an elongated cone, with the base turned forwards, in the flurgeon (acipenser flurum), the salmon and trout (salmo fario and salmo fario), the pike (eops lucius), the dory (eops lucius), &c.; it is long, conical, and fringed posteriorly in the flaurus eperlanus; short and oval in the narina belua, nar w and more elongated in the common eel, the eanger, and the flurgeon anguilla; it is long and pointed at both ends in the herring (cupida baren- gus). In the eel (gadus morhua), it is pointed posteriorly, touched or divided into a number of lobules along the sides, straight at the anterior part, from the corners of which two veriform processes go off, which are considerably convoluted. Cuvier describes these processes as two ducts, leading into the eelophagus, but they terminate in blind extremities; it is bifurcated anteriorly in the herring (gadus morhua), long and fringed in the hake (gadus merluccius); in the narina morhua it is oval in many of the genus narina. In the anatlepse retiformis it is small anteriorly, and enlarged behind; in the flacija cubicus, it is irregular, slightly notched before, and a little contracted in the middle; the flacija quadriruticata has the same figure, with two processes on the sides. In the genus flaurus the air-bag has the form of a heart, and contains internally a number of transverse lepta, which are incomplete upon the posterior of the eel. In many of the genus dieedus also similar partitions have been observed to exist.

The air bag in some fishes possesses two muscles; they are short thick layers, which pass downwards on each side of the anterior part of the bag. In the dory (eops lucius) they have an oval form, and have no foreign attachments, but belong entirely to the parieties of the bag. In the eel (gadus morhua) there are two muscles on each side, which are affixed to the two first lobules, or faculated portions of the eel bladder, and have their superior extremities inserted into the lips. Cuvier states that these muscles exist in the eelophagus of all fishes, and in the flacija cubicus, in which last species they are extremely thick. He supposes that the use of the muscles is to compress the air-bag, and, by diminishing the bulk of the air it contains, encroach the specific gravity of the fish. They appear, however, to be incompetent to such an effect, as they can only act upon the anterior portion of the bag; they are, therefore, probably destined to urge the air from the fore part of the bluddle, when the animal has occasion to defend in the water.

It is to be regretted that the different experiments, which have been instituted to ascertain the chemical properties of the air contained in this organ, have afforded such contradictory results: scarcely any two of them coincide with each other. Thus, La Cepede has stated that he discovered hydrogen gas in the air-bag of the carp (cyprinus carpio). Pocock found azote gas in that of the eelophagus of the trach (cyprinus carpio). Fischer met with carbonic acid gas. D. Breadth, in examining the air-bag of the flurgeon, &c. (cyprinus carpio),
fish gladius), sometimes found it to contain oxygen, and at others fixed air. Others have stated that the air-bag of the carp, &c. is filled with atmospheric air. Some later experiments on the subject have been communicated to the French National Institute by M. Biot. He ascertained that the contents of this organ varied from pure azote to 87ths of oxygen; but there existed no hydrogen. He stated that fresh-water fishes, which frequently swim near the surface, afforded the least proportion of oxygen; and he thought that this gas was in greater quantity, according to the depth of water from which the fish came.

Biot's experiments are very interesting, as they go some way towards reconciling the contradictory accounts of other physiologists, and may perhaps be considered as explaining the different degrees of purity observed at different times in the air of the bag in the same individual.

Anatomists are as much at variance with respect to the use of the air-bag, as they differ in their accounts of its contents. Needham supposed that the air produced in the blood was deposited in the bladder, and afterwards carried into the stomach, in order to assist digestion. Vieq d'Azyr adopted a similar opinion: he thought the bladder was subservient to digestion, and that it received the finer kinds of food. Fischer imagined this organ an accessory one to the gills, besides forwarding the motion of the animal in its element: he conceived that the fish came to the surface for the purpose of swallowing atmospheric air, which afterwards passed through the pulmonary duct into the bladder, and, when spoiled by remaining in contact with the vascular bodies or blood-veils, was expelled through the same channel.

It is impossible to conceive speculations more absurd or more easily overturned, than the preceding. Each of the above opinions supposes that there is always a communication between the air-bag and the alimentary canal, which, as before stated, is ascertained to exist in but a small number of fishes, but if this obstacle did not exist, both the theories of Needham and Vieq d'Azyr are still extremely improbable. The admixture of air with the alimentary substanies would interrupt, instead of promoting their digestion. It would be utterly impossible for any process similar to respiration to be carried on in a close sac; as the air could not be reconverted, its operation would cease, and to suppose the secretion of oxygen into the air-bag, and the absorption of the carbonic acid gas produced there, is perfectly preposterous; as well might an animal require in a close vesel.

The true and only use of the air-bladder appears to be to diminish the gravity of the fish in relation to its bulk, and thereby enable it to continue buoyant, or ascend in the water with little or no muscular effort; this is the popular notion; and hence the common name of swimming bladder or swim are used; in corroboration of which opinion it may be remarked, that those fishes have the largest air-bags which swim rapidly, and frequently ascend and descend in the water; that when it is want we can always discover some other modification or conditions in the organs of locomotion which are adapted to fulfill the same purposes, and that when such provisions do not exist the fish commonly grows at the bottom of the water. Thus the shark genus is furnished with a long and powerful tail, and the pectoral fins are in general of some f. z. In the mackerel (scomber scombrus) the skeleton and muscular substance are both light, and the tail is particularly strong; the garfish (sea bream), which has a light skeleton, and muscular substance very like the mackerel, has an extremely small air-bag. The flat fishes swim by means of a continual beating or flapping of the water with their broad surfaces, in a manner exactly analogous to flying.

Lafréry, the lamprey (petromyzon), which wants the air-bag and has a tail badly formed for swimming, generally lies buried in the mud at the bottom of the water.

To these observations we shall add some experiments we made upon one occasion on living fishes, the gudgeon and gudgeon (cyprinus rutilus and cyprinus gobio), which, in our opinion, put it beyond all doubt that the air-bladder is an organ of motion. A knife was plunged past the spine into the air-bladder; upon the air rushing out, the fishes descended to the bottom of the vessel of water, and there remained. In order to ascertain whether the inflow of such a wound could have any effect, a similar one was made upon other living fishes, taking care not to penetrate the air-bladder, but they afterwards ascended and descended as usual; an air-bladder was next removed from the body of one fish, and attached to the external part of the body of another fish, which had previously sunk to the bottom in consequence of the air being extracted from its bag by a wound; it now became as unable to descend in the water as it was before to rise, and was detained at the surface in despite of all its efforts to escape to the bottom of the vesel.

Two conclusions are to be drawn from the foregoing experiments: first, that the air-bag is absolutely necessary to the locomotion of those fishes, to which it naturally belongs, and that, in the body of the living fish some change is produced in the bulk, or quantity of the air contained in the bag to enable the fish to descend. Some anatomists have accounted for the diminution of the volume of air in the bag, by supposing it to be carried into the stomach or oesophagus, and thence expelled, but this could only take place in those few fishes which have a duct of communication between those parts.

Others have supposed that the air-bag is diminished by being compressed at the will of the animal, either by the great lateral muscles, or those situated at the anterior part of the bag: it seems, however, very doubtful whether the action of either of these muscles can materially affect the whole bag; but if this were granted, it might be still objected, that in some instances the air-bag is so thin as not to be able to sustain much compression without danger of being ruptured, and that in other instances its parietes are so thick as to resist a moderate degree of compression, and in the cobitis fistilus, it being an oblong sac, is incomprehensible.

Shall we suppose that the gaseous contents of the bag are encroased and diminished, as occasion may require, by secretion and absorption? There appears but one objection to this supposition, which is the rapidity that would be necessary in effecting these changes in the quantity of the air. It may be remarked, however, that air is secreted, under some circumstances, in the human stomach almost instantaneously; the secretion of saliva and the tears is, perhaps, equally rapid: the vascular action which conveys the fluid to the cheeks surges in velocity any of the voluntary motions of animals: it is, therefore, not inconsistent with some of the well known phenomena of the vascular system to suppose that the volume of air in the swimming bladder of fishes may be regulated according to necessity, by the vessel distributed to the parietes of the bag, or, perhaps, from those of the stomach, when these two parts communicate. It would be improper, however, to adopt this opinion upon the mere ground of its being possible: future experiments must determine what really are the means employed by fishes to alter their gravity.

Plate XIV. of the *Anatomy of Fishes* contains the illustrations of the structure of the air-bag. Fig. 1, represents the air-bladder of the dory, (seus fischer) turned inside out, in order to bring into view the internal coat and air glands.
glands, &c: at, the anterior part of the bag, b, the posterior
part: the argentine coat is seen through the internal
membrane, and at b the fishty looking coat which supplies
its place, the inner membrane adheres most loosely at this
part; c, e, f, the four air-glands or vascular bodies, d, the
blood vessel which is distributed to them with the accompa-
nying vein; e, r, the muscles seen through the inner
coat.

Fig. 2. exhibits the air-gland of the cod (Gadus morhua); e, the
surface presented to the cavity of the bag.

Fig. 3. is the air bladder of the cod, (Muraena anguilla)
divided longitudinally, and the parietes spread out; a, the
argentine coat, b, b, the internal membrane with its
blood-vessels; c, c, the two air-glands; on the left side the
inner membrane is raised to uncover the gland, and bring
into view the network of the air vessels upon it at d; c, c,
portion of the duct which goes to the stomach.

Fig. 4. represents a portion of the oesophagus and stomach
of the flounder (Pleuronectus fluviatilis) laid open, with a part of
the air-bag attached to it; a, the oesophagus; b, the stomach;
c, the air-bladder; d, the duct leading from one into the
other; surrounded by an annular muscle; e, the office of the
duct.

Fig. 5. is the double air-bag, with its duct in the carp
(Cyprinus carpio) inflated and dried; a, the anterior portion
of the bag; b, the posterior chamber with thinner parietes;
c, the duct; d, the difference before it terminates in the
alimentary canal, a portion of which is preferred at d.

Fig. 6. exhibits the stomach and air-bag of the eel (Anguilla
boreogena); a, the anterior part of the stomach; b, the
posterior or indistinguishable portion, from the extremity
of which a duct is seen going off to the air-bag c, which is
long and pointed at both ends.

Fig. 7. is a view of the air-bag in the Gilius helmin, cut
equal to show the partitions of the interior, which produce
a cellular appearance.

Electric Organs.

These parts, and the very singular faculty they bestow,
have been observed to exist but in a very small number of
species; there are only five fishes which are at present known
to possess the electric property. The torpedo (Raja torpedus),
the electric eel (Gymnotus electricus), the flounder electricus,
the Indian eel (Trichirias indicus), and the tetrando electricus.

The parts which produce the electric phenomena have
been described by several naturalists in the torpedo and gym-
notus, but most minutely and correctly by the late Mr.
Hunter, and the electric apparatus of the flounder electricus
has been described and delineated within these last years by
M. Geoffroy the French naturalist, but no account has yet
been given, as far as we know, of these organs in the electric
species of Trichirias and Tetrando.

Before entering upon the consideration of the phenomena
exhibited by the electric fishes, we shall give a description of
the organs by which they are produced in the torpedo,
the electric eel, and the flounder electricus; and with respect
to the two first, as the subject is peculiarly interesting, we
shall copy the detailed and accurate account published by
Mr. Hunter in the Philosophical Transactions.

The electric organs of the torpedo are placed on each
side of the cranium and gills, reaching from thence to the
semi circular cartilages of each great fin, and extending lon-
gitudinally from the anterior extremity of the animal, to the
transverse cartilage which divides the thorax from the abdo-
men; and within these limits they occupy the whole space
to the skin of the upper and of the under surfaces.

They are thicker at the edges near the centre of the fish, and
become gradually thinner towards the extremities.

Each electric organ, at its inner longitudinal edge, is
unequally hollowed, being exactly fitted to the irregular
projections of the cranium and gills. The outer longitudi-
nal edge is a convex elliptic curve. The anterior extremity
of each organ makes the section of a small circle; and the
posterior extremity makes nearly a right angle with the inner
edge.

Each organ is attached to the surrounding parts by a
close cellular membrane, and also by short and strong tendi-
nous fibres, which pass directly across, from its outer edge,
to the semi circular cartilages.

They are covered, above and below, by the common
skin of the animal, under which there is a thin fascia spread
over the whole organ. This is composed of fibres, which
run longitudinally, or in the direction of the body of the
animal. These fibres appear to be perforated in innumera-
ble places; which gives the fascia the appearance of being
calculated; its edges all around are closely connected to
the skin, and at last appear to be lost, or to degenerate into
the common cellular membrane of the skin.

Immediately under this is another membrane, exactly
of the same kind, the fibres of which in some measure de-
culate those of the former, y fling from the middle line of
the body outwards and backwards. The inner edge of this
is lost with the first described; the anterior, outer, and
posterior edges are partly attached to the semi circular car-
tilages, and partly lost in the common cellular membrane.

This inner fascia appears to be continued into the elec-
tric organ by so many processes, and thereby makes the
membranous sides or breadth of the columns, which are pre-
cently to be described; and between these processes the fascia
covers the end of each column, making the outer-
most or first partition.

Each organ of the fifth under consideration is about
five inches in length, and at the anterior end three in breadth,
though it is but little more than half as broad at the pos-
terior extremity.

Each consists wholly of perpendicular columns, reaching
from the upper to the under surface of the body, and vary-
ing in their lengths, according to the thickness of the parts
of the body where they are placed, the longest column being
about an inch and an half, the shortest about one-fourth of
an inch in length, and their diameters about two tenths of an
inch.

The figures of the columns are very irregular, varying
according to situation and other circumstances. The greatest
number of them are either irregular hexagons, or
irregular pentagons; but, from the irregularity of some of
them, it happens that a pretty regular quadrangular column
is sometimes formed. Those of the exterior row are either
quadrangular or hexagonal; having one side external, two
lateral, and either one or two internal. In the second row
they are mostly pentagons.

Their coats are very thin, and seem transparent, closely
connected with each other, having a kind of loose net-work
of tendinous fibres, passing transversely and obliquely
between the columns, and uniting them more firmly
together. These are most observable where the large
trunks of the nerve-paths. The columns are also attached
by strong tendinous fibres, passing directly from the one
to the other.

The number of columns in different torpedos of the size
of that now offered to the society, appears to be about
470 in each organ, but the number varies according to the
size of the fish. These columns increase, not only in size,
but...
but in number, during the growth of the animal, new ones forming perhaps every year, on the exterior edges, as there they are much the smallest. This process may be similar to the formation of new teeth, in the human jaw, as it increases.

"Each column is divided by horizontal partitions, placed over each other, at very small distances, and forming numerous interfaces, which appear to contain a fluid. These partitions consist of a very thin membrane, considerably transparent. Their edges appear to be attached to one another, and the whole is attached by a fine cellular membrane to the inside of the columns. They are not totally detached from one another; I have found them adhering, at different places, by a kind of felt, passing from one to another.

"The number of partitions contained in a column of one inch in length, of a torpedo which had been preserved in proof spirits, appeared, upon a careful examination, to be one hundred and thirty; and this number in a given length of column appears to be common to all sizes in the same state of humidity, for by drying they may be greatly altered; whereas it appears probable that the increase in the length of a column, during the growth of the animal, does not enlarge the distance between each partition in proportion to that growth; but that new partitions are formed, and added to the extremity of the column from the facein.

"The partitions are very vacuolar; the arteries are branches from the veins of the gills, which convey the blood that has received the influence of respiration. They pass along with the nerves to the electric organ, and enter with them; then they ramify, in every direction, into innumerable small branches upon the sides of the columns, fending in from the circumference all around upon each partition in all arteries, which ramify and anastomose upon it; and passing also from one partition to another, gradually with the vessels of the adjacent partitions.

"The veins of the electric organ pass out, close to the nerves, and run between the gills, to the auricle of the heart.

"The nerves entered into each electric organ, arise by three very large trunks from the lateral and posterior part of the brain. The first of these, in its passage outwards, turns round a cartilage of the cranium, and sends a few branches to the first gill, and to the anterior part of the head, and then paffes into the organ towards its anterior extremity. The second trunk enters the gills between the first and second openings, and, after furnishing it with small branches, paffes into the organ near its middle. The third trunk, after leaving the skull, divides itself into two branches which pass to the electric organ through the gills; one between the second and third openings, the other between the third and fourth, giving small branches to the gill itself. The nerves having entered the organs, ramify in every direction between the columns, and send in small branches upon each partition where they are fewest."

"The fish shown in Plate XV. of the Anatomy of Fishes, exhibits a view of the upper or back surface of the torpedo, on which the electric organ of each side is uncovered by raising the integuments, in order to show the extensive portion of the body of the fish, which these parts occupy: a, the integuments turned back, displaying on their inside an hexagonal net-work, which was the continuation of the columns into the skin; b, b, b, the ends of the column applied to the integuments. An exactly similar appearance presents itself on raising the skin of the inferior or opposite surface of the body of the fish.

In Plate XVI. of the Anatomy of Fishes, fig. 1, shows the electric organ of the torpedo on the right side, divided horizontally into nearly two equal parts at the place where the nerves enter; the upper half being turned outwards. a a, b b, c c, d d, the corresponding parts of trunks of the nerves as they emerge from the gills, and ramify in the electric organ.

"a a, the first or anterior trunk arising just before the gills.

"b b, the second or middle trunk, arising behind the first gill.

"c c, the anterior branch of the third trunk, arising behind the second gill.

"d d, the posterior branch of the third trunk, arising behind the third gill.

"Fig. 2 of the same plate, exhibits a perpendicular section of the torpedo, a little behind its inspiratory openings.

"a a, the upper surface of the gill.

"b b, the muscles of the back, as divided by the fiction.

"c c, the medulla spinalis.

"d d, the pharynx.

"e e, the right gill, split to expose the course of a trunk of a nerve through it.

"f f, the breathing surface of the right gill.

"g g, the fin.

"h h, the perpendicular columns which compose the electric organ, with a representation of their horizontal positions.

"i i, one of the trunks of the nerves, with its ramifications.

"The ptychognathus electricus may be considered both anatomically and physiologically, as divided into two parts: viz. the common animal part; and a part which is superadded, viz. the peculiar organ. I shall at present consider it only with respect to the last; as the first explains nothing relating to the other, nor any thing relating to the economy of fish in general.

"The first, or common animal part, is so contrived as to exceed what was necessary for itself, in order to give situation, nourishment, and most probably the peculiar property to the second. The last part, or peculiar organ, has an immediate connection with the first, the body affording it a situation; the heart, nourishment; and the brain, nerves, probably its peculiar powers. For the first of these purposes, the body is extended in length, being much longer than would be sufficient for what may be called its progressive motion. For the real body, or that part where the viscera and parts of generation are situated, with respect to the head, as in other fishes, is extremely short; so that, according to the ordinary proportions, this should be a very short fish. Its great length, therefore, seems chiefly intended to afford a surface for the support of the peculiar organ; however, the tail part is likewise adapted to the progressive motion of the whole, and to preserve the specific gravity; for the spine, medulla spinalis, muscles, fin, air-bladder, are continued through its whole length.

"Besides which parts, there is a membrane passing from the spine to that fin which runs along the belly or lower edge of the animal. This membrane is broad at the end next to the head, terminating in a point at the tail. It is a support for the abdominal fin, gives a greater surface of support for the organ, and makes a partition between the organs of the two opposite sides.

"The organs which produce the peculiar effect in the electric fish constitute nearly one-half of that part of the fish in which they are placed, and perhaps make more than one-third of the whole animal. There are two pair of these organs,
organisms, a larger and a smaller; one being placed on each side. The large pair occupy the whole lower or anterior, and also the lateral part of the body, making the thickness of the fore or lower parts of the animal, and run almost through its whole length; \textit{viz.} from the abdomen to near the end of the tail. It is broadest on the sides of the fish at the anterior end, where it inclines more of the lateral parts of the body, becomes narrower towards the end of the tail, occupying less and less of the sides of the fish, till at last it ends almost in a point.

These two organs are separated from one another at the upper part by the muscles of the back, which keep their upper or posterior edges at a considerable distance; below that, and towards the middle, they are separated by the air-bag, and at their lower parts they are separated by the middle partition.

They begin forwards, by a pretty regular edge, almost at right angles with the longitudinal axis of the body, situated on the lower and lateral parts of the abdomen. Their upper edge is a pretty straight line, with small indentations made by the nerves and blood vessels, which pass round it to the skin. At the anterior end they go as far towards the back as the middle line of the animal; but in their approach towards the tail they gradually leave that line, coming nearer to the lower surface of the animal. The general shape of the organ, on an external or side view, is broad at the end next to the head of the animal, becoming gradually narrower towards the tail, and ending there almost in a point. The outer surfaces of the organs are fitted to the shape of the parts with which they come in contact; therefore, in the upper and inner surface it is hollowed to receive the muscles of the back.

There is also a longitudinal depression on its lower edge, where a subfacile lies, which divides it from the small organ, and which gives a kind of fixed point for the lateral muscles of the fish. Its most internal surface is a plane adapted to the partition which divides the two organs from one another. The edge next to the muscles of the back is very thin, but the organ becomes thicker and thicker towards its middle, where it approaches the centre of the animal. It becomes thinner again towards the lower surface, or belly; but that edge is not so thin as the other.

Its union with the parts to which it is attached is in general by a loose, but pretty strong cellular membrane, except at the partition, to which it is joined so close, as to be almost inapplicable.

The small organ lies along the lower edge of the animal nearly to the same extent as the other. Its situation is marked externally by the muscles which move the fin under which it lies. Its anterior end begins nearly in the same line with the large organ, and just where the fin begins, it terminates almost in the end of the tail, where the large organ also terminates.

It is of a triangular figure, adapting itself to the part in which it lies. Its anterior end is the narrowest part; towards the tail it becomes broader; in the middle of the organ it is thickest; and from thence becomes gradually thinner to the tail, where it is very thin.

The two small organs are separated from one another by the middle muscles, and by the bones upon which the bones of the fins are articulated.

The large and the small organ on each side are separated from one another by a membrane, the inner edge of which is attached to the middle partition, and its outer edge is laid on the skin of the animal.

To expose the large organ to view, nothing more is necessary than to remove the skin which adheres to it by a loose cellular membrane. But to expose the small organ it is necessary to remove the long row of small muscles which move the fin.

The structure of these organs is extremely simple and regular, consisting of two parts; \textit{viz.} flat partitions or septa, and cross divisions between them. The outer edge of these septa appear externally in parallel lines nearly in the direction of the longitudinal axis of the body.

These septa are thin membranous, placed nearly parallel to one another. Their lengths are nearly in the direction of the long axis, and their breadth is nearly the semidiameter of the body of the animal. They are of different lengths, some being as long as the whole organ. I shall describe them as beginning principally at the anterior end of the organ, although a few begin along the upper edge, and the whole, passing towards the tail, gradually terminate on the lower surface of the organ; the lowermost at their origin terminating soonest. Their breadths differ in different parts of the organ.

They are in general broadest near the anterior end, answering to the thickest part of the organ, and become gradually narrower towards the tail; however, they are very narrow at their beginnings or anterior ends. Those nearest to the middle of the back are the broadest, owing to their curved or oblique situation upon these muscles, and grow gradually narrower towards the lower part, which is in a great measure owing to their becoming more transverse, and also to the organ becoming thinner at that place.

They have an outer and an inner edge. The outer is attached to the skin of the animal, to the lateral muscles of the fin, and to the membrane which divides the great organ from the small; and the whole of their inner edges are fixed to the middle partition formerly described, also to the air-bladder, and three or four terminate on that surface which inclines the muscles of the back. These septa are at the greatest distance from one another at their exterior edges near the skin, to which they are united; and as they pass from the skin towards their inner attachments they approach one another. Sometimes we find two uniting into one. On that side next to the muscles of the back, they are hollow from edge to edge, answering to the shape of those muscles; but become less and less towards the middle of the organ, and from that, towards the lower part of the organ, they become curved in the other direction. At the anterior part of the large organ, where it is nearly of an equal breadth, they run pretty parallel to one another, and also pretty straight; but where the organ becomes narrower, it may be observed, in some places, that two join or unite into one, especially where a narrow passes across. The termination of this organ at the tail is so very small, that I could not determine whether it consisted of one septum or more.

The distances between these septa will differ in fishes of different sizes. In a fish of two feet four inches in length, I found them \(\frac{7}{10}\) of an inch distant from one another; and the breadth of the whole organ, at the broadest part, about an inch and a quarter, in which space were thirty-four septa.

The small organ has the same kind of septa, in length passing from end to end of the organ, and in breadth passing quite across: they run somewhat serpentine, not exactly in straight lines. Their outer edges terminate on the outer surface of the organ, which is in contact with the inner surface of the external muscles of the fin; and their inner edges are in contact with the centre muscles. They differ very much in breadth from one another; the broadest being equal to one side of the triangle, and the narrowest scarcely broader than the point or edge. They are pretty nearly as

\[3 : 2\]

\[\text{FISH.}\]
equal distances from one another; but much nearer than
those of the larger organ, being only about 1/7th part of an
inch asunder: but they are at a greater distance from one
another towards the tail, in proportion to the increase of
breadth of the organ.

"The organ is about half an inch in breadth, and has
eighteen septa. These septa, in both organs, are very ten-
der in consistence, being easily torn. They appear to an-
swer the same purpose with the columns in the torpedos,
making walls or butments for the subdivisions, and are to
be considered as making so many distinct organs.

"These septa are interfaced transversely by very thin
plates or membranes, whose breadth is the distance between
any two septa, and therefore of different breadths in dif-
ferent parts; broadest at that edge which is next to the
skin; narrowest at that next to the centre of the body, or
to the middle partition which divides the two organs from
one another.

"Their lengths are equal to the breadths of the septa-
between which they are situated. There is a regular series
of them continued from one end of any two septa to the
other. They appear to be so close as to even touch. In
an inch in length there are about 240, which multiplies the
surface in the whole to a vast extent.

"The nerves in this animal may be divided into two
kinds: the first, appropriated to the general purposes of
life; the second, for the management of this peculiar func-
tion, and very probably for its existence. They arise in
general from the brain and medulla spinalis, as in other fish,
but those from the medulla are much larger than in fish of
equal size, and larger than is necessary for the common
operations of life.

"The nerve which arises from the brain, and passes
down the whole length of the animal, (which, I believe, exists
in all fish,) is larger in this than in others of the same size, and
passes nearer to the spine. In the common electric ray it runs in the
muscles of the back, about midway between the skin and
spine. In the coel, it passes immediately under the skin.
From its being larger in this fish than in others of the same
size, one might conjecture that it was intended for supplying the
organ to some degree; but this seems not to be the case,
as I was not able to trace any nerves going from it to join
those from the medulla spinalis, which run to the organ.

"This nerve is as singular an appearance as any in this
class of animals; for surely it must appear extraordinary, that
a nerve should arise from the brain to be lost in common
parts, while there is a medulla spinalis giving nerves to the
same parts. It must still remain one of the inexplicable cir-
cumstances of the nervous system.

"The organ is supplied with nerves from the medulla
spinalis, from which they come out in pairs between all the
vertebrae of the spine. In their passage from the spine, they
give nerves to the muscles of the back, &c. They
head forwards and outwards upon the spine, between it and
the muscle-s, and send out small nerves to the external sur-
face, which join the skin near, to the lateral lines. These
ramify upon the skin, but are principally bent forwards be-
tween it and the organ, into which they send small branches
as they pass along. They seem to be lost in these two parts.
The trunks get upon the air-bladder, or rather dip between it and
the muscles of the back, and continuing their course forwards upon that bar, they dip in between it and the or-
gan, where they divide into smaller branches; then they get
upon the middle partition, on which they continue to
divide into still smaller branches; after which they pass on,
and get upon the small bones and muscles which are the
bases for the under-fin, and at last they are lost on that fin.

After having got between the organ and the above-men-
tioned parts, they are constantly finding small nerves into
the organ; first into the great organ, and then into the
small one; and so into the muscles of the fin, and at last into
the fin itself. These branches, which are sent into the organ
as the trunk passes along, are of small size, that I could not
trace their ramifications in the organs.

"In this fish, as well as in the torpedo, the nerves which
supply the organ are much larger than those bestowed upon
any other part for the purposes of sensation and action; but it
appears to me, that the organ of the torpedo is supplied with
much the larger proportion. If all the nerves which go to
it were united together, they would make a vastly greater
chord than all those which go to the organ of this elcid. Per-
haps when experiments have been made upon this fish, equally
accurate with those made upon the torpedo, the reason for
this difference may be ascertained.

"How far this organ is vascular I cannot positively de-
termine; but from the quantities of small arteries going to
it, I am inclined to believe that it is not difficult in ve-

cels.

"The arteries arise from the large artery which passes
down the spine; they go off in small branches like the inter-

collic of the human subclavian, and pass around the air

bladder, and get upon the partition together with the nerves, and
distribute their branches in the same manner.

"The veins take the same course backwards, and enter
the large vein, which runs parallel with the artery." Phil.

Plate XVII. fig. 1. of the Anatomy of Fishes, exhibits
the whole of the two organs in the Gymnatus electricus on
each side, the skin being removed as far as these organs ex-
tend: a, the lower surface of the head of the animal; b, the
cavity of the belly; c, the anus; d, the fin; e, the back of the
organ where the skin has not been removed; f, the fin
which runs along the lower edge of the fish; g, the
fin turned back; h, h, h, the lateral muscles of the above
fin removed and turned back with the skin, to expose the small
organ; i, part of the muscle left in its place; k, k, the large
organ; m, m, m, the substance which divides the large organ from the small; n, at this place the
above substance is removed.

In Plate XVIII of the Anatomy of Fishes, fig. 1, shews
a section of the whole thickness of the Gymnatus electricus,
near the upper part, a little magnified. The skin is removed
as far back as the poll on the organ, and the other
parts immediately belonging to it, such as the medulla spi-
nalis. There are several pieces or sections taken out of the
organ, which expose every thing that has any relation to it.

At the upper and lower ends of the figure, f, f, the organ
is entire, the skin only being removed; a, a, the body of the
animal near the back, covered by the skin; b, b, the belly-
fin covered also by the skin; c, part of the skin removed
from the organ, and turned back; d, d, the muscles which
move the fin laterally, and which immediately cover the
small organ; e, the middle muscles of the fin, which lay
immediately between the two small organs; f, the outer
surface of the large organ, as it appears when the skin is re-
moved; g, the small organ, as it appears when the lateral
muscles are removed; h, b, the cut ends of the muscles of the
back, which have been removed to expose the deeper
feated parts; b, the cut ends of the large organ, part of
which has also been removed to expose the deeper seated
parts; k, the cut end of the small organ; l, a part of the
large organ, the reft having been removed; m, the cut end of
the above section; n, a section of the small organ; o, o,
the middle partition which divides the two large organs; \( p \), a fatty membrane, which divides the large organ from the small; \( g \), the air-bladder; \( r \), the nerves going to the organ; \( t \), the medulla pinnae; \( i \), the angular nerve.

Fig. 2, of Plate XVIII. of the Anatomy of Fishes, is a transverse section of the electric cell, exposing at one view all the parts of which it is composed: \( a \), the external surface of the skin, \( b \), the under-skin, \( c \), the cut end of the muscles of the back; \( d \), the cavity of the air-bladder; \( s \), the body of the spine; \( f \), the medulla pinnae; \( g \), the large artery and vein; \( h, h \), the cut ends of the two large organs; \( k \), the cut ends of the two small organs; \( l \), the partition between the organs.

The structure of the electric organ is less complicated in the \textit{Sillurus electricus} than in the \textit{torpedo} or \textit{gymnotus}. In this fish, Geoffroy describes it to be extended all round the body of the animal, immediately below the skin: it is formed by a considerable collection of cellular tissue, so thick and compact, that on the first view it might be taken for a stratum of hard; but when closely inspected, it is observed that this organ is composed of real tendinous or aponeurotic fibres interwoven with each other, and which, by their different gradations, form a reticulation, the meshes of which are not distinctly visible without the help of a magnifying glass. The small cells of this reticulation are filled with an albumino-gelatinous matter, exactly resembling that met with in the other electric fishes. All communication is prevented in the inside by a very strong aponeurosis, which extends over the whole electric reticulation, and which adheres to it so closely that it cannot be separated without tearing it. It is further covered by a thick layer of fat, which also contributes to infuse the organ.

The nerves which are distributed to the electric organ of the \textit{Sillurus} differ from those of the \textit{torpedo}, and the electric cell.

They proceed from the brain; and are the same which are found in all fishes, under the lateral line of the body; but these two nerves of the eighth pair in the \textit{Sillurus electricus} have a direction and volume which are peculiar to that species: they descend, approaching each other, on their issuing from the cranium, towards the body of the fish and vertebrae, which they traverse. They first introduce themselves through an orifice, peculiar to each other, and then issue on the opposite side by one aperture: after receding they suddenly separate, and proceed under each of the lateral lines. They are then found lodged between the abdominal muscles, and the aponeurosis, which extends over the electric reticulation. In the last place, they bend beneath the skin large branches, which proceed to the right and left of the principal nerve. These branches are in number twelve to fifteen on each side; they pierce the aponeurosis, which lines the interior surface of the reticular tissue, and are lost in the latter. Bulletin de la Société Philomatique, tom. iii. p. 166; and an extract from Annales du Musée N° 1, in Phil. Mag. vol. xv. p. 125.

In Plate XVI. of the Anatomy of Fishes, fig. 2, represents the \textit{Sillurus electricus}, with the organ exposed, by a large portion of the integuments being raised; \( a \), the aponeurosis, which extends under the whole of the electric organ; \( b \), the thickness of the reticulation; \( c, c \), the nerve of the eighth pair going to the electric apparatus; \( d, d \), abdominal muscles.

The substance which is found to fill the columns of the \textit{torpedo}, the interstices of the \textit{gymnotus}, and the muscles of the \textit{Sillurus}, is a peculiar combination of albumen and gelatine; it is of the same nature with the contents of what Monroe has improperly called the mucous ducts in fishes, and that transparent substance which envelopes the spawn of frogs; it does not diffuse, but becomes more solid when immersed in water, in conformance of the coagulation of its albuminous part; we have submitted it to the action of tannin, with which it combines, and forms an insoluble compound like gelatine.

The phenomena exhibited by electric fishes are of so extraordinary a nature that they have engaged the attention of every physiologist who has had the opportunity of observing them; but although every occasion has been embraced to make experiments upon the subject, much investigation is still required to arrive at the explanation of the electric faculty, and even to determine disputed points of fact. The very rare occurrence of procuring any of these animals alive in this country prevents us from adding any thing to the stock of knowledge already obtained upon the subject, we can therefore only quote the observations and experiments of other physiologists.

The preceding description of the electrical apparatus in three species would seem to prove, that a similar system of organization belongs to all fishes which enjoy the electric property. The effects of this structure are also similar, and differ chiefly with respect to the degree. All the electric fishes are capable of exciting in other animals a feeling resembling that produced from the shock of an electric jar.

The \textit{gymnotus} is endowed with the greatest power of this kind; the \textit{torpedo} next, and the \textit{Sillurus} the least of the three.

The \textit{gymnotus} is said, by Garden, to grow sometimes, in Surinam, 20 feet long, and to be able to give shocks which prove instantaneously fatal to any person receiving them. Mr. Humbolt states, that a \textit{torpedo}, about 14 inches long, communicated shocks which reached above the elbow, and were difficult to bear even by a person accustomed to receive shocks from an electrical machine; whilst, on the other hand, Walh found, in about 200 shocks, that only one was strong enough to pass beyond the elbow. Much of the force of the shock depends upon the natural strength of the animal and its vigour at the moment of the experiment; it is said to have very little electric power in winter; it is always much diminished in consequence of the fish remaining for any time out of the water. The shocks, however, do not appear to be increased in strength by repetition, unless the animal be otherwise exhausted. Thus Ingenhoz observed, 'that when the shocks of the \textit{torpedo} followed each other very fast, they were stronger at half than in the beginning.'

Electric fishes are capable of repeating the shocks very frequently in a short space of time. Mr. Walsh reckoned fifty in a minute and a half given by the \textit{torpedo}; and upon another occasion he calculated, that 100 were delivered in about five minutes.

When the \textit{torpedo} administers a shock it is always observed to depress the eyes and drop the triangular curtain which covers the pupil, and generally to make some movement of the lateral fins. The other electric fishes do not accompany these shocks by any visible muscular effort.

The \textit{torpedo} also differs from the others in sometimes becoming the part which touches it. Mr. Walsh accounts for the production of numbness by impounding the shocks to be very minute, and so closely following each other as not to be distinguishable, which may be effected by a succedaneous discharge of the numerous columns of the organ, in the manner of a running fire of machinery. In this continued effort, as well as the instantaneous shock, the eyes of the \textit{torpedo}, usually prominent, are withdrawn into their sockets; it is from the becoming property of the \textit{torpedo} that it derives its name.

The faculty in these fishes of exciting by the touch, the
sensation of a shock, or of numbes, in other animals, has been naturally and generally referred to the principle of electricity; even the Arabs, (according to Geoffroy) who always distinguished every animal by a generic and specific name, confounding only the extraordinary property of the torpedo and fibres electricus, and comparing it with physical electricity, called both fishes by the same name, radax or radax, which is also employed in the Arabian language to signify the fish.

Most physiologists have considered the electric organs of fishes as resembling exactly the Leyden jar, or rather a battery of them: they have compared the nerves and albumino-relatious substance to the metals, and the aponoeuroses to the glass; thus supposing the electric organ to consist of conducting and non-conducting substances, and that when the equilibrium is restored between them, the shock is produced.

Unquestionably there are many circumstances in which the common electric shock, and that obtained from fishes agree, but there are other points in which they materially differ.

The sensations occasioned by artificial and animal electricity are similar.

The shock from an electric fish is only communicable through what are called conducting substances, and is also intercepted by the non-conductors; thus it may be received through the medium of wire of different metals, wood, water, and the animal substance; while a person touching it with glas, sealing-wax, &c., receives no shock, notwithstanding the fish gives evidence of the discharge by the motion of the eyes, &c.

The shock will be transmitted to a number of persons taking hands; those at the extremities completing the ring by touching the fish. In this manner Walsh has communicated a shock to four or five people at the same moment, who experienced exactly the sensation of a shock from an electric jar, except that it was weaker. Dr. Williamson gave shocks to ten or twelve persons at once by an electric cell.

The effect of the electric fishes differs from common electricity in several circumstances. However strong the shock may be, it never has been seen to produce the least noise or luminous appearance. Most experimentalists also agree, that the shock will not pass through the smallest portion of air; the conducting substances must be in actual contact with each other.

Williamson screwed two pieces of wire in opposite directions into a board, leaving an interval between their points of the 1/6th part of an inch, his assistant and himself held the opposite ends of the wire, and established a communication with the cell by means of their other hands, but no shock passed. On repeating the experiment and screwing the wires so as to bring their points within the distance of the thicknesses of double post paper of each other, the shock was felt by both persons, but till no spark was discernible, which we conceive renders the accuracy of the experiment doubtful.

Dr. Bancroft indeed affirms, that in Guiana the electric eel shocked his hand at the distance of some inches from the water; a result, however, so very different from the observation of all other experimentalists appears more than questionable.

The electricity of fishes has not the effect of attracting floating substances. When a person is immersed, and touches the fish, he receives a shock as at other times, but gives no appearance of excess of electricity, however long he may keep up his communication with the animal. A Leyden phial also, being put into contact with an electric fish, never becomes charged.

The electric organ differs from the Leyden phial, as Volti has very properly observed, by being entirely composed of conducting substances. The aponoeuroses and membranes which form its various surfaces are not of an insulating nature, like glas, rosin, silk, &c. They cannot be exposed to friction, nor dipped and charged in the manner of the small plates of Franklin, or electrophores. Volti, therefore, concludes that the electric organs do not act upon the principle of a Leyden jar, or an electrophore or condenser, but that they entirely resemble the Galvanic pile, in which conducting substances become exciters of electricity, by being placed in a particular relation with respect to each other.

It would appear that the electric phenomena of fishes are produced in a manner differently from every species of physical electricity. The former are not accompanied with any chemical changes, they do not affect our organs of sense, by any display of light, excitation of odour, or explosive sound. Their mode of operation is not regular and uniform, or governed by external influence, but depends upon the life, and even upon the volition of the animal; for all experimentalists agree in stating that the electric fishes regulate the strength and frequency of the shocks at pleasure. There is no appearance of accumulation or diminution of the electric power, except what arises from the will of the animal; the last shocks which occur after fishes admittins being often more strong and frequent than the first.

The nerves seem to be the principal agents in the exercise of the electric faculty, as they are always found larger in the organs than would be required in parts of the same magnitude, for any species of sensation or voluntary motion.

The great error of physiologists has always been to account for the operations of organized beings, upon the principles which regulate the phenomena of inanimate matter. We are led to make this observation from comparing the electric faculty of fishes, with the property of exhibiting light in some animals, and the power of generating heat, which is found in all living bodies; these three functions, although producing different results, appear to be very similar in their nature, and are equally inexplicable by the laws of physical and chemical attractions; the strong effect of which may be found in the want of success, which has followed all the attempts that have hitherto been made to explain them upon these principles.

Of what use is the electric property to those fishes which possess it? Drs. Williamson and Garden state, that it is employed to kill, or at least stupefy other fishes, upon which they prey.

The former relates, amongst his experiments on the electric eel, that some small fishes being thrown into the same water where it was swimming, it immediately killed and swallowed them; but a larger fish being thrown in, it was also killed, although it was too large for the eel to swallow; another fish was thrown into the water at some distance from the eel, it swam up to the fish, but presently turned away, without offering it any violence. After some time it returned, when, seeming to view it for a few seconds, it gave the fish a shock, upon which it instantly turned up its belly and continued motionless; at the same instant Dr. Williamson received a shock in his hand, which had been previously introduced into the water. A third fish was thrown into the water, to which the eel gave such a shock that it turned on its side, but continued to give signs of life; the eel seeming to observe this as it was turning away, immediately returned and struck it quite motionless. The eel never attempted to swallow any of these fish after the first, although he killed many of them.
F I S H.

in great abundance on the coasts of England, and many other places, and is in its greatest perfection in the beginning of the summer, though some times later than others, according to the severity or mildness of the winter. The whole occasion of these fish coming in such quantities is to feed on this plant; and those who would attend to its growing up, would know when to expect the mackerel better than those who lien for thunder for the signal of them. These come at certain seasons to the coasts of Provence and Languedoc, in the same sands that herrings and mackerel do to other places. This seems to be on another occasion; the fish called by the French the emperor, and by the same confounded with the sword-fish, is the great enemy of these fish, and in summer is so plentiful in those seas, that they find no way of saving themselves, but by flying to the shallow waters, where the other cannot easily follow them; hence they frequent the shores. The pilchards caught upon the coasts of Brittany, and making a considerable article of commerce for that province, are yet a stronger proof of the natural means that bring fish in shoals to certain places, than any other. These fish evidently come for food, and that not natural to the place, but prepared for them by the inhabitants.

The people of Brittany purchase from Norway the offal and entrails of all the large fish caught in the northern seas; this is of late years become a regular and considerable article of trade; they cut these to pieces, and sell them in vast quantities over the whole surface of the sea along their coasts, at times when the winds do not blow so as to blow it off. This always brings together the pilchards in vast shoals as the herring and mackerel come in other places; and the fishermen catch them in such quantities, as to be able to supply all the maritime places in the neighbourhood, with them, at a small price. The salmon, a fish bred in rivers, yet going at certain times to the sea, is another of those fish which come up at times in vast shoals. See Salmon.

We may here add that the desire of food urges fish of one species to follow those of another, upon which they prey, through immense tracts of ocean, even from the vicinity of the pole down to the equator. Thus the cod from the banks of Newfoundland purifies the whiting, which is driven before it even to the southern shores of Spain; and the eel, a species of whale, is said, in the same manner, to purify a shoal of herrings, and to swallow great numbers at a mouthful.

In the Philosophical Transactions, No. 463, sect. 1. we have a method of preparing specimens of fish, by drying their skins, as practised by Dr. Gronovius.

F is h, Black. See Perca nigra and Silurus aquatarius.

F is h, Petrified, in Natural History. The remains of scabrous or funny fish in the strata, are not very commonly found, compared with the vast numbers and variety of all fish whose remains are found; but some very perfect specimens do occur in different strata. Dr. Tewson (Phil. of Mineral. p. 165) seems to consider fishes as peculiar to some particular kinds of strata; in which, however, he is evidently mistaken, though often they are found in flinty limestone, in the quarries of L'Aberche and Pappenheim; see W. Martin's Outlines, &c. pp. 206. and 79. Mr. Kirwan (Geol. Eff. pages 243. 245. 245. 255. and 257.) mentions fishes as having been found in different parts of the world in gypsum, in marl, in argillite, in fine-slime, and in argillaceous sand-flone. On the mountains of Castile, great diversity of fishes are found, in a white laminated stone. And in the blue marls, or water limestone strata of England, beautiful specimens of flattened fish are said to be found. at Barton on Soar, in Leicestershire, (the other Barrow near Flete.)

them. When any of the larger fishes that had been shocked, although apparently dead, were removed into water in another vessel, they presently recovered. Phil. Trans. vol. 65. p. 97.

Dr. Garden gives precisely the same account of the electric eel killing or benumbing its prey, and states that it kills, by repeated shocks, fish which are larger than it can swallow.

It seems, therefore, that the electric property is not an useful one to those fishes which possess it; besides being the means of securing their prey, it must also form an excellent defence for them against the larger fishes, which might otherwise devour them. For a more detailed account of the torpedo, and gymnatus electricus, we refer the reader to France. Redi Exper. Nat. 1666. Obserazioni intero alle Torpedini, de Stecch. Lorenzini, 1678.—Kernp. Amen. Exot. 1712.

—A letter from Jno. Wallis, eqq. Dr. Frankhii, on the electric property of the torpedo, in Phil. Trans. vol. 65. p. 461.—Experiments and observations on the gymnatus electricus, or electricelled, by Dr. Hugh Wiliiamson, Phil. Trans. vol. 65. p. 94. —Account of the gymnatus electricus, by Dr. Alex. Garden. Phil. Trans. vol. 65. p. 102.—Experiments made at Leyghorn on the torpedo, by Dr. Jhn Ingenhouz, Phil. Trans. vol. 65. p. 1.—Banister's Natural History of Guinea. —Histoire Naturelle des Poissons, par Lepceps, tom 26. —A Letter from Professor Volta to Sir Joseph Banks, on the electricity excited by the apposition of different conducting substances, in Phil. Trans for 1800, part 2. —Memoir on the Comparative Anatomy of the electric organs of the torpedo, the gymnatus electricus, and the florus electricus by E. Geoffroy, in vol. 5 of the Annales de Mecueen National. —Experiments on the torpedo, by Mfrs. Humbolde and Guy Luf- fis. in Annales de Cheme, No. 166.

Fish, Migration of, denotes their departure from some parts of the ocean and their removal to other parts; and also to rivers at certain seasons of the year, for the purpose of depositing their spawn, or of obtaining the means of subsistence.

The migration of certain kinds of fish in shoals and infinite multitudes, to certain coasts at certain times of the year, is a thing of great advantage to mankind, as it gives opportunities of taking them with great ease, and in vast quantities; but the reason of these periodical returns of the several kinds does not seem much understood, though a little observation would probably clear it up. There is a small fish common in many seas, but particularly plentiful on the coasts of Normandy in the months of June, July and August. This is well described by Rondelet, under the name of the sea-caterpillar; and at this time of the year it is so frequent in the place before mentioned, that the whole surface of the water is covered with it as with a scum. This is the season of the year when the herrings come in such prodigious shoals to those coasts. The fishermen complain much of these nally venom, which disturb their fisheries; but they do not consider that it is to these alone that their fisheries are owing; for it is evident that the herrings feed on these creatures greedily, by the vast quantity found in all their stomachs; and it is highly probable, may scarcely be doubted, that the reason of these fish coming up in such numbers is to feed on them; probably, if observation was made, the same would be found to be the case in all the other places where the herrings come in the same sort of plenty. The mackerel come down in the same numbers regularly at certain times of the year, and for the same sort of reason. This fish is an herb-eater, and is particularly fond of that sea-plant called by naturalists the narrow-leaved purple palnated sea-wrack; this grows
Bredon in the same county has quarries of the yellow or magnesia limestone, a circumstance not always adverted to, in speaking of barrow lime, and in other places on its range. Mr. Graydon (Irish Tran. vol. v. p. 315.) supposes the monte bolca limestone to have been suddenly interred by being enveloped in a diffusion of lime, arising from immense maizes of calcareous slime, ejected in a calcined state, by submarine volcanoes. To us it seems more probable that the igneous rocks were destroyed by the original creation of the earth, and which now engulfs them, whose diffusion in the water wherein they lived, occasioned their fall to the bottom and extension on their flat side when dying, in the position in which they now appear on the lamina of the lower limestone before the upper one, which engulfs them, was produced by the precipitation of the lime matter from the fluid that had occasioned their death; and on similar principles, we think it easy to account for all the fossil reliquia, or relics of the primary creation of organized beings, see Ref. 11. under which title, we propose to give the heads of Mr. W. Martin's excellent mode of arranging extraneous fossils, from his work above quoted.

Fish, with regard to commerce, is distinguished into dry, pickled, green, and red. Dry or salt fish, is that which is salted, and dried either by the heat of the sun, or by fire. Such principally are the cod, rockfish, pilchard, anchovy, and pilchard. See Fishpond. Green fish, is that lately salted, and which yet remaining moist; as green cod, &c. Pickled fish, is that boiled and steeped in a pickle made of salt, vinegar, &c. as salmon, cod, herrings, macarel, pilchard, anchovy, and oysters. Red fish, is some fresh fish broiled on the gridiron, then refined in oil of olives, and barrelled up with a proper liquor, as new oil, vinegar, salt, pepper, cloves, and laurel leaves, or other herbs. The best fish thus prepared areurgeon and tunny.

Fish, considered as a food, makes a considerable article in the furniture of the table; and the breeding, feeding, catching, &c. of them, constitute a peculiar art of no small moment in the economy of a gentleman's house and garden. To this relate the ponds, tanks, &c. described in their proper places. See Fishpond, Stew, &c.

Fish, Breeding of, is a practice similar to that of blowing flih, poultry, and pigs, and adopted for the same deceitful purposes. The method of blowing fish, especially cod and whiting, is by placing the end of a quill or tobacco-pipe at the vent, and pricking a hole with a pin under the fish, which is next the gill; thereby making the fish appear to the eye large and full, which, when dried, will be flabby, and little less than skin and bones. But this imposition may be discovered by placing the finger and thumb on each side of the vent, and squeezing it hard; the wind may be perceived to go out, the skin will fall in, and the fish appear lank and of little value.

Fish, Breeding of. See Fishpond.

Fish, Calmation of, is a method first practised by Mr. Tull, in order to prevent the excessive increase of fish in some of his ponds, where the numbers did not permit any of them to grow to an advantageous size. But he afterwards found, that the calmated fish grew much larger than their usual size, were more fat, and always in feation. This operation may be performed both on male and female fish; and the most eligible time for it is when the ovaries of the female have their ova in them, and when the vesels of the male, analogous to these, have their seminal matter in them; because at this time, these vesels are more easily distinguished from the ureters, which convey the urine from the kidneys into the bladder, and are situated near the seminal vesels on each side of the spine; which, without sufficient attention, may be mistaken for the ovaries, especially when these last are empty. The time best proper for this operation, is just after they have spawned, because the fish are then too weak and languid to bear with success, so severe an operation; however, with skill and care, it may be performed almost at any time. When a fish is to be calmarated, it must be held in a wet cloth, with its belly upwards, and tied with a sharp pen-knife, having its point bent backwards, the operator cuts through the integuments of the rim of the belly, taking care not to wound any of the interstiles. As soon as a small aperture is made, he carefully inserts a hooked pen-knife, and with this dilates this aperture from between the two forefins, almost to the anus. He then, with two small blunt silver hooks, five or six inches long, and of this form, by the help of an assistant, holds open the belly of the fish; and with a spoon or spatula, removes carefully the interstiles from one side. When these are removed, you see the ureter, a small vesel, nearly in the direction of the spine, and also the ovary, a larger vesel, lying before it, nearer the integuments of the belly. This last vesel is taken up with a hook of the same kind with those before mentioned, and, after detaching it from the side far enough for the purpose, divided transversely with a pair of sharp scissors, care being taken that the interstiles are not wounded or injured. After the ovaries has been divided, the operator proceeds to divide the other in the same manner; and then the divided interstiles of the belly are fewed with fish, the fish bones being inserted at a small distance from one another. Mr. Tull observes farther, that the spawning time is very various; that trouts are fall about Christmas; perch in February; pikes in March, and carp and tench in May; and that allowance must be made for climates and situation, with regard to the spawning of fish. When the fish are calmarated, they are put into the water where they are intended to continue; and they take their chance in common with other fish, as though they were not calmarated. With tolerable care, few die of the operation. Phil. Tran. vol. xlviii. part n. art. 160.

Fish, Eyes of. See Eyes and Anatomy of Fish.

Fish, Fecundity of, has been taken notice of by various writers, who have furnished inferences of it in some particular species that have been thought surprising. M. Petit is said to have found in the carp 321,144 eggs; and Lewenhoeck, in a cod of middling size 6,374,000. But Mr. Mathews has lately performed the operation of the curious subject with peculiar attention and accuracy, and extended his inquiries to a greater variety of species than any other person. The method which he adopted was that of weighing the whole spawn very exactly; he then took a piece weighing a certain number of grains, and carefully counted the eggs contained in it; and by dividing the number of eggs by the number of grains, he found, nearly, how many eggs there were in each grain. His computation of the number of eggs exceeded no farther than to those when he could distinguish with his naked eye; though by this limitation, he omitted many eggs, discoverable by a microscope, that might justly have been counted. The weights he used were avoidupoises, and he reckoned 437 2/3 grains to an ounce.

The following table exhibits the general result of his enquiries: the first column contains the names of the fish which he examined; the second, their weight; the third, the weight of their spawn; and the fourth their fecundity; and the fifth the time of the year, when each species of fish was examined. He has also added other columns, exhibiting the portion of spawn weighed, and the number of eggs found in a grain, and the result of examining several varieties.
ties of the same species of fish of different weights, which the curious reader may consult. See Phil. Trans. vol. 111. for 1767. art. 32. p. 230.

Abstract of the Table.

<table>
<thead>
<tr>
<th>Fish</th>
<th>Weight of spawn. oz.</th>
<th>Weight of spawn. dr.</th>
<th>Fecondity.</th>
<th>Eggs.</th>
<th>Time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carp</td>
<td>25</td>
<td>2571</td>
<td>1014</td>
<td>April 4.</td>
<td></td>
</tr>
<tr>
<td>Cod-fish</td>
<td>24</td>
<td>1259</td>
<td>5486</td>
<td>Dec. 23.</td>
<td></td>
</tr>
<tr>
<td>Herring</td>
<td>10</td>
<td>480</td>
<td>3696</td>
<td>Aug. 1.</td>
<td></td>
</tr>
<tr>
<td>Lobster</td>
<td>20</td>
<td>1671</td>
<td>21669</td>
<td>Oct. 25.</td>
<td></td>
</tr>
<tr>
<td>Mackeral</td>
<td>10</td>
<td>1223</td>
<td>34681</td>
<td>June 18.</td>
<td></td>
</tr>
<tr>
<td>Perch</td>
<td>8</td>
<td>763</td>
<td>2032</td>
<td>April 5.</td>
<td></td>
</tr>
<tr>
<td>Pike</td>
<td>2</td>
<td>5100</td>
<td>493</td>
<td>April 12.</td>
<td></td>
</tr>
<tr>
<td>Prawn</td>
<td>127</td>
<td>610</td>
<td>3867</td>
<td>May 21.</td>
<td></td>
</tr>
<tr>
<td>Roach</td>
<td>10</td>
<td>36</td>
<td>815</td>
<td>May 2.</td>
<td></td>
</tr>
<tr>
<td>Shrimp</td>
<td>39</td>
<td>7</td>
<td>6807</td>
<td>May 3.</td>
<td></td>
</tr>
<tr>
<td>Smelt</td>
<td>2</td>
<td>159</td>
<td>382</td>
<td>Feb. 21.</td>
<td></td>
</tr>
<tr>
<td>Soal</td>
<td>14</td>
<td>54</td>
<td>100362</td>
<td>June 13.</td>
<td></td>
</tr>
<tr>
<td>Tench</td>
<td>40</td>
<td>40</td>
<td>383152</td>
<td>May 28.</td>
<td></td>
</tr>
</tbody>
</table>

* N. B. Part of the spawn of this fish was accidentally lost, and therefore this number is considerably too small. Such an amazing increase, if allowed to attain maturity, would overflow nature; and even the ocean itself would not be able to contain, much less to provide for its inhabitants. But this surprising fecundity is widely directed to two important purposes; it preserves the species among innumerable enemies, and it serves to furnish the rod with sufficiently adapted to their nature.

**Fish, Feeding of.** 1. In a stream, thirty or forty carps may be kept from October to March, without feeding; and by fishing with trammels, or flews, in March or April, you may take from your great waters, to recruit the flews; but you must not fail to feed all summer, from March to October again, as constantly as cooped chickens are fed; and it will turn to as good an account.

2. The confinement and regularity of serving the fish conduceth very much to their well eating, and thriving.

**Fish, Care of.** It is best committed to the gardener, who is always at hand, and on the spot.

**Fish, Weights.** Any sort of grain boiled is good to feed with, especially peas and in hot course ground; the grains after breeding, while fresh and sweet, are also very proper; but one bushel of millet, not brewed, will go as far as two of grains; chippings of bread, and parings of a table, steeped in top-droppings of strong beer, or ale, are excellent food for carps. Of these the quantity of two quarts to thirty carps, every day, is sufficient; and to be fed morning and evening, is better than once a day.

**Fish, Feeding of.** There is a sort of food for fish that may be called accidental, and is no less improving than the bell that can be provided; and this is when the pools happen to receive the wash of commons, where many sheep have pastured; the water is thus enriched by the soil, and will feed a much greater number of carps than otherwise it would do; and further, the dung that falls from cattle standing in water in hot weather, is also a very great nourishment to fish. See further on the method of feeding carp, and the advantages resulting from it, under the article Fish-ponds.

**Fish, Feeding of.** The bell feeding place is towards the mouth of the pond, at the depth of about half a yard; for by that means the deep will be kept clean and neat, the meat thrown into the water, without other trouble, will be picked up by the fish, and nothing will be lost; yet there are several devices for giving them food, especially peas; as a square board like a trencher, supported by four strings, one at each corner, with leads at the bottom for fish to play under. When fish are fed in the larger pools or ponds, where their numbers are great, malt boiled, or fresh grain, is the bell food. Thus carp's may be fed and raised like capons, and perch will feed as well; but perch are not for a fish in feeding time.

**Fish, Generation of.** The general opinion of the world as to the generation of fish, is, that the female deposits her spawn in eggs, and that the male after this ejects the sperm or male semen upon it in the water, by means of which they are fecundated. The supposed want of the organs of generation in fish, has given an apparent probability to this; but Linnaeus is very decided against it. He affirms that there can be no possibility of the impregnation of the eggs of any animal out of its body.

To confirm this, the general course of nature, not only in birds, quadrupeds, and insects, but even the vegetable world, has been called in to his assistance, as proving that all impregnation is performed whilst the ova are in the body of the parent, and he supplies the want of the organs of generation by a very strange process, affirming that the males eject their semen always some days before the females deposit their ova or spawn, and that the females swallow this, and have their eggs by that means impregnated by it. He says, that he has often seen three or four females at this time frequently gathered about the male, and greedily snatching up into their mouths the semen he ejects; he mentions sons of the same sex, some perch, and some of the eel species, in which he had been present at this process. Mr. C. also affirms, that he has frequently seen fishes in actual copulation, and that the whole business is generally done before the ova arrive at maturity. Phil. Trans. vol. xlviii. part ii. art. 106. p. 87. See EXPLANATION OF FISH.

**Fish, Generation of.** Fishes have different seasons for depositing their spawn; some, that live in the depths of the ocean, will not choose the winter months; but in general those with which we are acquainted choose the hottest months in summer, and prefer such water as is somewhat warmed by the beams of the sun. They then leave the deeper parts of the ocean, which are the coldest, and fixed round the coasts, or in the upraised sea water rivers, which are warm, as they are comparatively shallow. When they have deposited their buds, they return to their old stations, and have their progeny to fight for themselves. The spawn continues in its eggstate in some fishes longer than in others; and this is preparatory to the animal's life. E. g. in the salmon, the young spend continues in the egg, from the beginning of December till the beginning of April; the carp continues in the egg, or above three weeks; the little white fish from China is produced in 10 days. All these, when exhausted, are not able to he their uninterfered with agility. They rise, sink, and swim much more readily than grown fish, and they can escape into shallow waters when pursued. But with all these advantages, 

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Fearely one in a thousand survives the imminent perils of its youth.

Fish, General Name of. See General Name.
Fish, Gilding of. See Gilding.
Fish, Hearing of. See Anatomy of Fish.
Fish, Fisheries. See Island-fish.
Fish, Mill of. See Milt.
Fish, Needle. See Needle fish.
Fish, Night Gill. See Anatomy of Fish.
Fish, Nonas. See Royal Fishes.
Fish, Shell. See Shell and Conchology.
Fish, Stealing of. See Swimming of, Air-bladder, and Anatomy of Fish.
Fish, Teeth of. See Anatomy of Fish.
Fish, Malaria. See Pisces.
Fish-day. See Abstinence.
Fish, in Heraldry. See Heraldry.
Fish Bay, in Geography, a bay on the S. coast of Africa. S. lat. 30° 30'. E. long. 22° 3'.—Allo, a bay on the W. coast of Africa. S. lat. 16° 40'.—Allo, a bay on the N. E. coast of the island of St. Matthew, in the Mergui Archipelago.
Fish, Little, a bay on the W. coast of Africa. S. lat 15° 20'.
Fish Creek, a river of Virginia, which runs into the Ohio. N. lat. 30° 31'. W. long. 81° 5'.—Alo, a river of Maryland, which runs into the Chesapeake. N. lat. 33° 38'. W. long. 76° 43'.
Fish River, a river of West Florida, which runs into Mobile bay. N. lat. 30° 30'. W. long. 87° 50'.
Fish River, Great, Rio Pignonia of the Portuguese, a river of Africa, which rises in the country of the Hotten-tots, beyond the Snowy mountains, and, in its long course, collects a multitude of dreamlets, most of which are constantly supplied with water. On each side of its mouth is a rocky and open shore, but the projecting cliffs form a small cove or creek, which was frequented by the Portuguese shortly after their discovery of the Cape; though from the basaltic appearance of the rock upon the bar that evidently covers the entrance of the river, it is difficult to conceive how they could trust their ships in such an exposed situation; in fact, indeed, they were so small as to be able, at high water, to cross the bar, in which case they might lie, at all feasons, in perfect security. Great Fish river is now considered as the eastern boundary of the Cape Colony.

FISHBONE CREEK, a river on the N. side of the isle of Wight, which runs into the sea. N. lat. 52° 44'. W. long. 1° 4'.

FISHER, John, in Biographia, a worthy English Catholic prelate, was born at Beverley in Yorkshire in the year 1450. His father dying when he was very young, he was placed under the instructions of a priest of the collegiate church in his native town. In the year 1474 he was entered a student at Michael House, Cambridge, a college that is now incorporated into Trinity-college. He took his degrees in the year 1488 and 1491. In 1495 he was appointed one of the proctors of the university, and in a few months afterwards he was chosen master of Michael house, and entered into holy orders. He soon became distinguished on account of his great learning; and attained the high office of vice-chancellor of the university. Scarcely had he performed the duties of chancellor two years, when he was selected as chaplain and confessor to Margaret countess of Richmond, the king's mother. He so entirely gained the confidence of this lady that she committed herself and family to his government and direction. By his advice she established a divinity professorship at Oxford and one at Cambridge; and founded Christ's and St. John's colleges in the latter university. In 1501 he was admitted doctor in divinity, and in the following year the lady Margaret's first divinity professor in Cambridge. In 1504 he was raised to the bishopric of Rochester, and was afterwards frequently offered more valuable fees, which he refused, observing, that "though others have larger revenues, I have fewer souls under my care, so that when I shall have to give an account of both, which must be very soon, I would not defire my condition to have been better than it is." Fisher was now chosen chancellor of the university of Cambridge, and was much engaged in superintending the building of Christ's and St. John's college, being the most active agent and executor of the late countess of Richmond. When St. John's college was finished Fisher went to Cambridge, and opened it with due solemnity, and was commissioned to draw up a body of statutes which should establish it as a college in its own right and as a valuable benefactor to the college, and was the means of the appointment of that illustrious man, Erasmus, to lady Margaret's professorship of divinity, and afterwards to the Greek professor's chair. To the innovations proposed by Luther, bishop Fisher was decidedly hostile: he not only endeavoured to prevent the propagation of Lutherism in his own diocese, and in the university of Cambridge, but wrote and preached with the utmost zeal against it. He is generally thought to have had a principal share in the composition of the work ascribed to Henry VIII., and published with his name, in defence of the "seven sacraments," against Luther, though Burnet and others are not disposed to give it to the bishop. Fisher at this period was very high in favour with the king, and so zealous in his opposition to the tenets of Luther, that he formed a design of going to Rome to concert measures with the popes for opposing his progress; but he was diverted from his design by cardinal Wolsey's convocation of a synod of the whole clergy of England for the same purpose. In this assembly he appeared in the character of a zealous advocate for reformations in the manners of the clergy; and some of his speeches on this and other important occasions are preserved in the Biographia Britannica. About the year 1527 the king applied to him for his opinion on the subject of his marriage with Catherine, his brother's widow. This was the rock on which he found red. So long as his sentiments were congenial with those of the monarch he was in the highest esteem; but now he gave a determination which did not correspond with his passions; he declared honestly, and without any reserve, "that there was no reason to question the validity of the marriage, since it was good and lawful from the beginning." The bishop had made up his mind on the business, and nothing could divert him from an avowal of it on all proper occasions, though he probably foresaw that his own ruin would be the consequence of his yielding integrity. When the divorce came to be argued before the two legates, Campeggi and Wolsey, bishop Fisher, who was one of the queen's counselors, was at the court, and professed himself willing to resign his see; but to this the pope would not consent, and Fisher retained his see, and the office of chancellor, until his death.
cil, exerted himself with much zeal in her behalf, presenting the legates with a book which he had written in defence of the marriage. The bishop did not stop here; he opposed the king in some other of his projects, and resiled a motion made for the suppressing of the smaller monasteries, and granting their revenues to the crown. The speech which he delivered on this occasion was received with great applause by those who adhered to the papal church, and with equal disapprobation by the advocates of the reformation. Some expressions which he used so much offended the house of commons, who complained to the king of the reflections which the bishop had cast on the representative people, that the king sent for the prelate, and having heard his defence, dismissed him with an admonition, "to be more temperate in future." In the year 1530 he was twice in imminent danger of his life. His first escape was from poison which a man by the name of Roufe threw into some gruel preparing for the bishop's dinner; his second was from a bullet fired into his library where he usually sat. After this the bishop retired to Rochester, where he spent most of his time. In 1531 the question was agitated as to giving Henry VIII. the title of supreme head of the church of England: the bishop took the negative side of the question, and opposed the project with all his zeal. He next opposed his sovereign by giving credit, or at least listening to the enthusiastic visions of Elizabeth Barton, the pretended holy maid of Kent. This woman, who was only an instrument in the hands of designing persons, carried on her importunities with a view of alienating the affections of the people from the king, and exciting insurrections against his government. The bishop, it was very evident, had no ill design in the part he took; but finding the prophetets, as she was then denominated, was devoted to the interests of the queen; and having heard much of the fancy of her manners, of the visions which she saw, and of the predictions which she uttered, and which were said to be realized, he conceived she was designing by Providence to display and make triumphant the doctrines and authority of the church of Rome, over the principles of Lutheranism, which were rapidly spreading in England. Fisher accordingly listened to her prophecies, and conceded one of them which seemed to affect the king, or at least to strike a blow at his authority. She announced to her adherents, that if Henry should proceed in his divorces, and marry another wife, he would not be king feven months afterwards. This woman was apprehended, and in the hope of pardon confessed the particulars of her importunity, and named all those who had encouraged her delusions. The bishop was urged to make submissions to the king as the only way of allaying his anger; he refused, and in 1534 a bill of attainder was passed against Elizabeth Barton and her accomplices. Bishop Fisher still refused to submit, and was adjudged guilty of misprision of treason, and condemned to forfeit all his goods and chattels to the king, and to be imprisoned during his majesty's pleasure. It is not certain that the act was enforced against him; but when the act was passed to annul the king's marriage with Catherine of Arragou, and to confirm that with Anne Boleyn, and enjoining all to take the oaths accordingly, bishop Fisher, instead of uniting with his brethren, left the capital. Opportunity was, however, given him again and again to consider the oath, till at length he absolutely refused; and was attainted in the parliament which met in 1534, and his bishopric was declared void. The bishop was thrown into the Tower, where he was treated with much severity, and, as it should seem, from some of his letters, fearfully alarmed the common necessaries of life. Here he would probably have been permitted to have ended his days, had not a cardinal's hat been conferred on him by pope Paul III. which so enraged the king, that he swore it should never be permitted to enter his dominions; and if Fisher were determined to wear it, it should be on his shoulders, for he would not leave him a head for the purpose.

From this time his destruction was resolved on, and the tyrant sent the solicitor-general, Rich, whose name is rendered infamous by undertaking the business, to pump out of him his secret opinions with regard to the supremacy, declaring he had the king's authority to say that no ill use whatever should be made of the communication, which he fought merely on account of the high opinion he entertained of his judgment and integrity. "The bishop gave an unreserved decision on the subject, which the solicitor carried to his master; and on the instant a special commission was issued for trying him for high treason. Rich was the chief and indeed the only evidence that could affect the life of the venerable prisoner, and yet a jury, as infamous as the evidence, found him guilty. The bishop pathetically appealed to the court on the occasion, "I pray you, my lords, consider that by all equity, justice, wordly honesty, and courteous dealing, I cannot be directly charged with treason, though I had spoken the words indeed, the same not being spoken maliciously, but in the way of advice and counsel, when it was requested of me by the king himself; and that favour the very words of the statute do give me, being contrary against such as shall maliciously gain the king's supremacy, and none other: wherefore, although by the rigour of the law you may take occasion to condemn me, yet I hope you cannot find law, except you add rigour to that law to call me down, which hereby I hope I have not deserved." To Rich he addressed himself, "Mr. Rich, I cannot but marvel to hear you come in to bear witness against me of these words, knowing in what secret manner you came to me." He then assured the court that he (Rich) had told him, the king wished him to declare, that on the honour of a king, whatever he should say by this his secret messenger, he should reap no peril or danger therefrom, nor should any advantage be taken against him for the same. Still the court gave sentence, and notwithstanding the honour of a king was opposed to it, Henry confirmed the bloody decree, and the worthy prelate was beheaded on Tower Hill on the 22nd of June 1535, at the age of seventy-five. Erasmus represents him as a man of the greatest integrity, of a strict learning, incredible sweetness of temper, and grandeur of soul. By friends and by enemies he was regarded as a pious and charitable man, not only learned himself, but a great encourager of learning. His chief work was a "Commentary on the seven patristical Pfalmus." Biog. Brit.

FISHER, in Zoology. See Mustela Zibellina.

FISHERMAN'S COVE, in Geography, a harbour on the S. coast of Pitt's Archipelago, within Nepanet's bound. N. lat. 53° 18'. E. long. 23° 53'.

FISHERROW, a town of Scotland, in the county of Edinburgh, at the mouth of the Eik, in the parish of Torith, opposite to Musselburgh.

FISHER'S CANAL, a branch of an inlet leading from Fitzhugh's found, on the W. coast of North America, as called by Capt Vancouver in 1793. At the entrance N. lat. 54° 5'. E. long. 232° 5'.

FISHER'S ISLAND, an island in the Atlantic in Long-island, found, near the S. coast of Connecticut. It is about ten miles in length and two in breadth, with a good soil, favourable for rearing sheep and producing wheat and other grain. It is annexed to the township of South-held, in
Suffolk county, on Long Island. N. lat. 41° 12'. W. long. 72°.

FISHERSFIELD, a township of America, in the state of New Hampshire and county of Hillsborough, incorporated in 1763, containing 526 inhabitants; about 16 miles easterly of Charlestown.

FISHERY, a commodious place for fishing; or a place wherein great quantities of fish are caught.

The principal fisheries of Europe for salmon, herring, cod, and mackerel, are along the coasts of England, Scotland, and Ireland; for cod, on the banks of Newfoundland; for whales, about Greenland; for pearls, in the East and West Indies, &c.

FISHERY also denotes the commerce of fish; more especially the catching of them for sale. The fishery makes a principal branch of the British commerce. A great quantity of vessels and seamen are employed therein; and besides what is spent at home, large sums are yearly returned, merely for herring, cod, and pilchards, exported to Spain, Italy, and several parts of the Mediterranean, and the islands of the Archipelago.

Yet are our countrymen reproached, and with a good deal of justice, for their remissness in this branch of trade. The advantageous situation of our coasts might be of immense benefit to us, did we not let our neighbours overreach us therein. The Dutch, French, Hamburghers, &c. have been accustomed to come yearly in large fleets, and not only to take the fish from our own coasts, but fell them to us for our money, when they have done.

Scotland fuffers incredibly on this score; no country in Europe can pretend to rival it in the abundance of the fine fish, wherewith its numerous harbours, loughs, rivers, &c. are flored. In the river Dee, it is said, an hundred and seventy head of salmon is not very extraordinary for a single draft of a net; and the picked salmon sent hence is allowed the best in Europe. The Scottish islands, especially those on the western side, do certainly lie the most commodiously for carrying on the fishing trade to perfection.

King Charles I. directed his attention to the Scottish fisheries in 1633 and 1635, in conjunction with a company of merchants under his royal commission and patronage, and encouraged by his bounty. With this view he ordered Lent to be more strictly observed; prohibited the importation of fish taken by foreigners, and agreed to purchase from the company his naval stores, and the fish for his fleets; but the civil wars soon set this plan aside. The company had built two fishhouses or magazines; one on the small island of Hermitra, on the north side of North Uist, and the other upon a small island in Loch Maile, a celebrated bay of the above-mentioned North Uist. King Charles II. in 1661, made a like attempt; and was joined in it by the duke of York, lord Clarendon, and several other persons of rank and fortune. In prosecution of the design the most salutary laws were enacted by the parliaments of England and Scotland, in virtue of which all materials used in, or depending upon, the fisheries, were exempted from all duties, excises, and other imposts. In England the company was authorized to set up a lottery, and to make a voluntary collection in all parish churches; and other encouraging measures were adopted. Some Dutch families were invited, or permitted, to settle at Stromway; but whilst the plan appeared to be judiciously formed and likely to succeed, the king having a prejuring occasion for money, was perfidious to withdraw what he had employed in the fishery, at which the merchants joined with him, being displeased, did the like themselves. In 1677, a new royal company was established in England, at the head of which were the dukes of York, the earl of Derby, &c. Besides all the privileges which former companies had enjoyed, the king granted this new company a perpetuity, with power to purchase lands, and also 200l. to be paid them annually out of the customs of the port of London, for every dogger or buss they should build and send out, for seven years to come. A fleet of 10,980l. was immediately advanced, and afterwards 1600l. more. This small capital was soon exhausted in purchasing and fitting out busses, and other incidental expenses. The company, however, made a successful beginning, and one of their busses or doggers took and brought home 32,000 cod-fish; other vessels had also a favourable fishery. But most of the busses, having been built in Holland, and manned with Dutchmen, the French, then at war with Holland, took six out of seven vessels, with their cargoes and fishing tackle; and the company, being in debt, sold, in 1680, the remaining vessels, &c. A company of merchants raised a new subcription of 60,000l. under the privileges and immunities of the former charter. But this attempt proved abortive by the king’s death and the troubles of the next reign. Soon after the revolution the business was again resumed on a more extensive scale, the proposed capital being 500,000l.; but this scheme failed. Since the Union, several efforts have been made to retrieve it; and in 1750 there was a corporation settled on that footing by parliament, called “the Society of the Free British Fishery,” for the term of twenty-one years, under the direction of a governor, president, vice-president, council, and other officers, who were empowered to make bye-laws, &c. and to raise a capital of 500,000l., and the Scotch fishery, encouraged by fishing-chambers, erected in several cities, which establishments promised a more permanent duration. See Herring Fishery.

FISHERY, Anchovy. See Anchovy.

FISHERY, Cod. The cod is a fish of passage, pretty large, with a great head, and teeth in the bottom of the throat; its flesh white; its skin brownish on the back, white under the belly, and covered with a few thin, transparent scales.

It is excellent food when fresh; and, if well prepared and salted, will keep a long time. The fish, thus prepared, is commonly eaten among us in Lent, &c. under the denominations of salt-fish, or pickled-fish.

There are two kinds of salt cod; the one called green- or white; and the other dried, or cured; though it is the same fish, only differently prepared.

They are also distinguished by the places from whence they are brought, as well as by the manner of curing, into Aberdeen-fish, Iceland-fish, green-fish, rock-fish, North-sea cod, poor Jack, and barrelled cod.

Green Cod.—The chief fisheries for green cod are in the bay of Canada, on the Great and Little Bank, near the coast of Newfoundland, the isle of St. Peter, or Pierre, and the isle of Sable; and thither vessels are yearly sent from divers parts both of America and Europe.

The vessels used herein are from a hundred to a hundred and fifty tons burden; and these will bring thirty or thirty-five thousand fish a-piece.

The most essential articles in this fishery are the persons who know how to open the fish, to cut off the heads, and to take them; upon this, almost the only occasion of which last the success of the voyage chiefly depends.

Several authors will have it, that the Biscayans, in pursuance of their whale’s, made the first discovery of the Great and Little Banks of cods at Newfoundland, Canada, &c. a hundred years before Columbus’s time; and that it was a Biscayan...
Bifayan Newfoundlander that gave the first intimation thereof to Columbus.

Others say, that the Great Bank was discovered by a native of St. Malo's, named Cartier. England claimed an exclusive right to the North American seas, in virtue of the discovery of those seas by Sebastian Cabot, in the service of King VII., and first to the northward of thirty degrees; and though the discovery is certainly highly valuable; there is not a trading nation in Europe but allows the commerce of cod-fish to be one of the most secure and gainful that is known.

The bell, largest, and fattest cod are those taken on the southern and western sides of the Great Bank, which is a kind of submarine mountain, stretching from N.E. to S.W., one hundred and fifty miles long, and fifty broad, and at the distance of twenty-five leagues from Newfoundland: those on the north side are generally much smaller. The water on the bank is from 22 to 50 fathoms; on the outside from 60 to 80; on the lefier banks much the same. A great fewell and thick fog generally mask the place of this bank. The chain of lesser banks lies between Newfoundland and Cape Cod in New England; as the Green, French, Porpoise, and Saline Banks, and also Browns and St. George's. Besides these banks, the whole coast of Newfoundland, New England, Nova Scotia, and Labrador, is one continued fishery.

The belt season for this fishery is from the beginning of February to the end of April; at which time the cod, which, during the winter had retired to the deepest part of the sea, return to the Bank, and grow very fat.

Those caught from March to June keep well enough; but those taken in July, August, and September, soon spoil. The fishing is sometimes done in a month, or six weeks; and sometimes it holds four or five months. As Lent draws on, if the fishermen have but half their cargo, they strive who shall make homeward the first; the market being then the bell.

Some will thus make a second voyage, before others have got loading for the first. Each fisher only takes one cod at a time; and yet the more experienced will take from three hundred and fifty to four hundred per day; but this is the most; for it is very fatiguing work, both on account of the weight of the fish, and of the extreme cold which reigns on the Bank.

The wages usually allowed the captain and sailors is one third of the cod they bring home found.

They salt the cod on board. The head being cut off, the belly opened, and the guts taken out, the fisher ranges them in the bottom of the vessel, head to tail; and having thus made a layer thereof, a fathom or two square, he covers it with salt; over this he lays another layer of fish, which he covers as before; and thus he dispenses all the fish of that day, taking care never to mix the fish of different days together.

By that time the cod has lain thus to drain three or four days, they are moved into another part of the vessel, and salted after. After this they are no more to be touched, till the vessel has its burden.

Sometimes they put them up in barrels, for the convenience of carriage.

Dry Cod.—In the fishing of dry cod, vessels of all sizes are used; though such are generally choico, as have large holds, because this sort of fish incumbers more than it burdens.

As cod is only to be dried by the sun, the European vessels are obliged to put out in March or April, to have the benefit of the summer for drying. Indeed, we feed vessels for cod in June and July; but those only buy what had been fished and prepared by the inhabitants of Newfoundland, and the neighboring parts; in exchange for which, we carry them meal, brandies, biscuits, pulse, molasses, linen, &c.

The principal fishery for dry cod is along the coast of Phoebus, from Cape Rofe to the Bay des Experts; in which compass there are divers commodious parts for the fish to be dried in.

The fish intended for this use, though of the same kind with the green cod, is yet much smaller; whence it is the fitter to keep, as the salt more easily penetrates it.

The method of fishing is much the same in both; only this latter is the more expensive, as it takes up more time, and employs more hands; and yet scarce half so much fish is spent in this as in the other.

When several fishing vessels meet, and intend to fish in the same port, he whose shallops first touches ground, becomes entitled to the quality and privileges of admiral; he has the choice of his station, and the disposal of all the wood on the coast at his disposal. (10 & 11 W. III. c. 25.)

As fast as the captains arrive, they unrig all their vessels, leaving nothing but the thongs to sustain the mast, and in the mean time the masts are provided with tent on shore, covered with branches of fir, and falls over them; with a scaffold, fifty or sixty feet long, and about one-third in breadth.

While the scaffold is making ready, the crew are fishing; the proceeds of which, as it is described by Mr. Pennant in his "Arctic Zoology," is as follows:

The boats or shallops are 40 feet in the keel, rigged with a main-mast and fore-mast, and log-falls furnished with four oars, three of which row on one side, and the other (which is twice as large) slays the others, by being rowed sideways over the stern, by a man who stands for that purpose, with his face towards the rowers, contriving them, and steering at the same time as he gives way to the boat. Each of the men in this boat is furnished with two lines, one at each side of the boat, each furnished with two hooks; so that sixteen hooks are here constantly employed, which are thought to make a tolerable good day's work of it, if they bring in from five to ten quintals of fish, though they have流感age for, and sometimes bring in thirty. Two hundred quintals are called a faying voyage, but not less. The bait is small fish of all kinds: herring, capelin, lance, tom cod or young cod; the fish of which they fell, and keep for some time, in case of scarcity of the rest; but these are much less eagerly taken by the fish when salted. In case small fish cannot be gotten, they use kip, which are easily taken in small numbers, by laying nets over the holes in the rocks where the water comes to reach the night. If neither small fish nor birds are to be procured, they are forced to use the raws of fish which they catch; but this is the worst but of any.

When the fish are taken they are carried to the flounder, which is built with one end over the water, for the convenience of throwing the offal into the sea, and for their boats being able to come close to discharge their fish. As soon as they come on the flounder, a boy hands them to the header, who hands at the side of a table next the water, and whose business is it to gut the fish and cut off the head, which he does by pricking the back of the head against the side of the table, which is made sharp for that purpose, when both head and guts fall through a hole in the floor into the water. He then throws the fish to the splitter, who stands opposite to him; his business is to split the fish, beginning at the head, and opening it down to the tail.
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tail; at the next end he takes out the larger part of the back-bone, which falls through the floor into the water. He then shakes the filth off the table, which drops into a kind of hand-barrow, which, as soon as it is filled, is carried off to the salt-pile. The header also flings the liver into a separate bucket, for the making of whale oil, used by the curriers, which bears a higher price than whale oil.

In the salt-pile the fish are spread upon one another, with a layer of salt between them. Thus they remain till they have taken salt, and then the salt is washed from them by throwing them off from shore in a kind of float, called a "pound." As soon as this is completed, they are removed to the last operation of drying them; which is done on standing flake, made by a flight whate, just strong enough to support the men who lay on the fish, supported by poles, in some places as high as twenty feet from the ground; here they are exposed, with the open side to the sun; and every night, when it is bad weather, piled up five or six in a heap, with a large one, his back or skinny part uppermost, to be a shelter to the reef from rain, which hardly damages him through his skin, as he lies floating each way to float it off. When they are tolerably dry, which in good weather is in a week's time, they are put in round piles of eight or ten quintals each, covering them on the top with back. In these piles they remain three or four days to sweat; after which they are again spread, and, when dry, put into larger heaps, covered with canvas, and left till they are put on board.

When prepared they are sent to the Mediterranean, where they fetch a good price; but are not exported in England, for which place another kind of fish is prepared, called by them "Mud-fish," which, instead of being split quite open, like their dry-fish, are only opened down to the navel; they are salted and laid in salt, which is washed out of them in the same manner with the others; but instead of being laid out to dry, are barrelled up in a pickle of salt boiled in water.

The train oil is made from the livers; and it is so called to distinguish it from whale or seal oil, which they call fat oil, and is sold at a lower price (being only used for lighting of lamps) than the train oil, which is used by the curriers. It is thus made: they take a half-tub, and, boring a hole through the bottom, press hard down into it a layer of spruce boughs, upon which they place the livers, and expose the whole apparatus as sunny a place as possible. As the livers corrupt, the oil runs from them; and, draining itself clear through the spruce boughs, is caught in a vessel set under the hole in the tub's bottom.

The founds and tongues are salted at the same time with the fish, and barrelled up: the roes or eggs, being salted and barrelled up, serve to cast into the sea to draw fish together, and particularly pilchards.

By the definitive treaty between Great Britain and France in 1763, the French, who are allowed to fish in the gulf of St. Lawrence, are now absolutely deprived of the powerful fortifications of Cape Breton, and of the possession of Canada and all its dependencies; and are entitled to no possessions contiguous to Newfoundland, except the small islands of St. Peter's, or Pierre, and Miquelon, ceded by the article of the said treaty to his most Christian Majesty as a shelter for the French fishermen; and his most Christian Majesty engages not to fortify the said islands, to erect no buildings upon them, but merely for the convenience of the fishery, and to keep upon them a guard only of fifty men for the police. And by the eighteenth article of the said treaty, it is expressly stipulated between Great Britain and Spain, that his Catholic Majesty deftis, as well for himself as for his successor, from all pretensions which he may have formed in favour of the Guipuscoans and other his objects, to the right of fishing in the neighbourhood of Newfound-

The French, by the treaty of 1783, were to enjoy their fisheries on the northern and western coasts; the inhabitants of the United States having the same privileges as before their independence: and the preliminaries of October, 1811, confirm the privileges granted to the French.

By 43 Geo. III. c. 154, a bounty of 31. per quintal shall be paid on the importation of pickled salmon and dry cod from the island of Newfoundland; the master and mate of every ship importing making oath, at the port of importation, that such fish was taken and cured by British subjects carrying on the fishery at Newfoundland or Labrador; and such fish may be exported without repayment of the bounty. For other regulations of this fishery, see 19 & 20 W. III. c. 25; 26 Geo. III. c. 26; 27 Geo. III. c. 19; 29 Geo. III. c. 53.

Of all the migrating fishes, herrings excepted, the cod is the most valuable to mankind. This fish, we may here observe, is found of cold climates, and is supposed to remain chiefly between the latitudes of 66° and 45°. Those that are taken north and south of these latitudes are either few in number, or bad in quality. They are found as far north as Greenland, but they are small and unacclimated. In Europe they chiefly frequent the coasts of Iceland, Norway, the Baltic, the islands and main land of Scotland. After passing these latitudes, they decrease in number. The English fishermen take them on the Dogger-bank, the Well-bank, and the Cromer, lying on the coast of the kingdom, opposite to Norfolk, Lincoln, and Yorkshire. Of these the Dogger-bank is the most extensive and valuable for white fish in general, as we learn from the account transmitted to Mr. Pennant by Mr. Travis, surgeon in Scarborough. The Dogger-bank lies 12 leagues from Flamborough-Head, and 15 miles from Scarborough; the north side of the bank stretches off E.N.E. between 32 and 40 leagues. The fishermen seldom find any cod, fry, or other round fish upon the bank itself, but upon the floating edges and hollows contiguous to it. The shifting sand on the top of the bank affords them no sufficiency; and the shallow agitated water allows them no rest. It is in the hollows between the Dogger and the Well-bank that the cod are taken which supply the London market. The shore along the coast on the one hand, and the edges of the Dogger-bank on the other, like the sides of a decay, give a direction towards our fishing grounds to the shores of cod, and other fish, which migrate annually from the northern ocean into our seas; and the great variety of fishing grounds near Scarborough, extending upwards of 14 leagues from the shore, afford secure retreats and plenty of proper food for all the various kinds of fish, and also suitable places for each kind to deposit their spawn in.

The bell bait for all kinds of fish is fresh herring cut in pieces of proper size; and next to these, the leifer lampreys, small haddock cut in pieces; sand-worms, mussels, and limpets; and, in defect of these, bullock's liver. The hooks are smaller than those used in Iceland and Newfoundland; being 2 inches long in the shank, and near an inch wide between the shank and the point. The line is made of small cordage, and is always tanned before it is used. The bell weather for succeeding in fishing is a half calm, when the waves are just curled, with a silent breeze.

In our seas the cod-fish begin to spawn in January, and deposit their eggs in rough ground among rocks. Some continue in the rock till the beginning of April. Thesefishes
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fishes in general recover sooner after spawning than any other; and, therefore, it is common to take some good ones all the summer. Those of a middling size are most esteemed for the table, and are selected by their plumpness and roundness, especially near the tail; by the depth of the pit behind the head, and by the regular condulated appearance of the sides, as if they were ribbed. The cod, and other fish of this genus, are in highest favour in the winter; but even then, the glutinous parts about the head lose their delicate flavour after the cod hath been 24 hours out of the water. The general weight of these fish on the Dogger-bank is from 14 to 40 pounds.

The Scottish white fishery, comprehending cod, ling, hake, turbot, skate, foals, and flounders, abound so universally around the Scottish shore, that the whole northern seas, from the Dogger-bank in lat. 54° to the northern extremity of Iceland in lat. 67°, and from the coast of Norway eastward to unknown latitudes on the west, may be considered as one great fishery, in which Scotland, as lying in the centre, has manifestly the advantage over all other nations. The white fishery may be supposed to comprehend the eastern coast fishery from Berwick to the Pentland firth, the Shetland or N.E. fishery, and the Hebride or N.W. fishery. The most considerable of the banks in the eastern fishery, called by way of pre-eminence the "Long Fortys," stretches in a parallel line with the easter coast, from the county of Durham to Kinnaird's head, at the entrance of the Moray firth; thus affording an uninterrupted line of fisheries almost from one extreme of the kingdom to the other, and in some parts at a very inconsiderable distance from the shore. The Shetland fisheries are carried on by two different methods; viz. by boats accompanied with decked vessels, and by boats only. Those of the first class go out of sight of land, where, in 90, 100, and 120 fathoms water, they get the largest fish. When they arrive on the fishing grounds, they set their long lines, each line of 56 fathoms having 15 hooks; and these lines are joined to one another, till the number of hooks amounts to from 600 to 1000. In the fishery by boats of 2 tons burden, and 6 men each, they fish in summer at the distance of 7 to 15 leagues from land, and in winter at the distance of 3 leagues. The summer fishery is carried on from the 18 of June to the 18 of August; the boats go out three times a week, and continue 24 hours each time. The large boats carry from 150 to 120 lines; each line being from 54 to 60 fathoms in length, and hung with 15 hooks at 20 feet distance from one another. In winter they use lead lines, when long ones cannot be managed. They bait with a small fish called pollocks, when at sea; and if these cannot be procured, they use cod, turbot, haddock, or any other fish. The Hebride or N.W. fishery extends from the head of the Solway firth to the coast of Iceland, lying at the distance of 400 miles N.W. from the Long island in the Hebrides. The principal bank in the fishery grounds, lying between the Hebrides and the main land, begins near the mouth of Garden in Roft-lane, and is supposed to stretch in a N.W. direction, towards the Butt of the Lewis, and possibly beyond that cape. This abounds in all the varieties of white fish. A chain of small banks stretches along the east side of the Lewis, from 3 to 5 miles off the shore, and is carried on by the natives both in summer and winter. The whole coast of the Shetland is also one continued fishery, and the seas of the South Hebrides present a number of fishing banks, which our limits will not allow us to recite. But the most extraordinary and valuable bank is called by the old natives the "Mother-bank," and lies between Mull on the east, and Barra and South Uist on the west. There is a bank between the islands of Coll and Colland Tirey, in the direction of the small island of Ganna, which lies in the centre. A valuable bank lies between the islands of Mull, Coll, and Ardanaurchan, on the main land of Argyllshire. In the sound of Mull there is a small bank, which stretches from Aros to Scaladale's bay. There is an inconsiderable fishery along the coast of Argyllshire, called the Inner Sound; a bank lies between Loch Tarbat in Jura, and the isle of Colonia, 16 miles long and 1 broad. Another lies in the channel between Jura and Ilay on the west, and the main land of Knapdale on the east. Those which we have enumerated are the principal banks of the Hebrides, on the west side of the Mull of Cantire. On this side of the cape, within the firth of Clyde, there is a good fishing ground around the Craig of Ailsa; from whence a large bank stretches from Ballintire in Arran, and thence, along the coast, to the Mull of Galloway, where it is lost in the Irish channel. Another bank stretches in a N.W. direction towards Sunda island, and from thence towards Knapdale, off the north side of Arran. Such is the immense scene of improvements, with regard to the Scottish white fisheries, that presents itself to those who are anxious to promote the British fisheries. In some respects the Scottish fisheries have the advantage of those of Newfoundland. The banks of Newfoundland lie at the distance of 2500 to 3000 miles from London, Bristol, Liverpool, Dublin, Cork, and Glasgow; and can only be frequented during the months of February, March, April, May, and June: whereas the Scottish fisheries, when the proposed navigations shall be opened, will, upon a medium, be within a week's sailing of these commercial emporiums, which they can annually in seafons when the Newfoundland fisheries cannot be carried on.

The Irish white fisheries are chiefly cod, ling, hake, coal-fish, and haddock. In these fisheries the Irish are very expert, being trained to the business by their fishing on the banks of Newfoundland, as well as the bays of that island; to which fisheries some thousands of Irishmen resort every seafon, and from whence they return with a small pittance to their families. White fish abound on the west coast of Ireland; but no regular fishery has yet been established with success. See more on this subject in Knox's View of the British Empire, &c.


F I S H E R Y, Herring. The herring is a small salt-water fish, with a bluish back, and a white ferrled belly, not unlike a little shad fish; whence it is called in Latin alfa minor. Rondellet calls it haragus.

It is a popular error to believe the herring to be the bale of the Romans. The bale was so particular fish, but a kind of fauce, made of any kind of salt-fish. The modern herring seems to have been unknown to the ancients; it is neither the bale, nor bales, nor manis, nor innonnis, nor the gera, or Pliny. See Rondellet de Piscib. Marin. lib. v. cap. 13, and Vullios de Idalal. See HERRING.

Herrings are chiefly found in the North sea. In those inconsiderable seas, that are covered with ice during a great part of the year, the herrings hid a quiet and safe retreat from all their numerous enemies; there neither man, nor their full more destructive enemy, the sun-fish, or the exhaust, the most voracious of the whole kind, dares to pursue them. It is true, there are fisheries elsewhere, but none so obvious.

They usually make two fishing seasons for herrings: the first in June, July, and August; the second in autumn. The latter of these is the more considerable, on account
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of the fogs, which are very favourable to this kind of
thing.

The herrings usually keep at some distance from the
coast in July and August; and it is at this time only that
the fishers follow them in the open sea. About the end
of August, and until the middle of September, they come into
shallow water, where they remain for some time in the bays
and inlets of the coast; and this is termed the ground draw.

It hath been observed, that the arrival of the herrings on
the coast of Shetland is certain, and almost to a day, on or
before the 22d of June. As they invariably follow a
southern course, after leaving the Shetland islands, they
reach the Hebrides in July, and keep pressing forward till
the beginning of September, when they go into deep
water.

Fresh shoals appear in November, and continue till Ja-


Frenish. They is an instance which, and cai'd
is far July, but before 22d June. As they invariably follow a


The winter rendezvous of the herrings is probably the
icy sea, within the Arctic circle; as this sea swarms with in-
fects in greater abundance than in our warmer latitudes.

From this sea the great colony of these fishes冬天 about
the middle of winter; and this colony is composed of such
numbers as to exceed the power of imagination. But they
have no sooner left their retreats than they have to encounter
with a multitude of enemies. The fowl-fish and eel-fish
devour them in great abundance; and belugas, the porpoise,
the grampus, the flark, cod-fish, haddock, pollock, and
the numerous tribe of dog-fish find them an easy prey,
and defies from making war upon one another. To these
enemies we may add immeasurable flocks of seal-fish that chiefly
inhabit the northern regions towards the pole, which watch
the outlet of their perilous migration, and spread among
them extensive ruin. In this state of danger, the defeeds
emigrants crowd closer together, as if they could thus se-
cure themselves against the attacks of their enemies.
The main body begins to separate, at a certain latitude, into
two great divisions; one of which moves to the west, and
pours down along the coasts of America, as far south as
Carolina, and becomes so numerous in the Chesapeake bay
as to be a nuisance to the shores. The other division
takes a more easterly direction towards Europe, and falls in
with the great island of Iceland about the beginning of
March. Upon their arrival on that coast, their phalanx,
which hath already suffered considerable diminution, is
nevertheless found to be of such extent, depth, and densi-
fity, as to occupy a surface equal to the dimensions of
Great Britain and Ireland; but subdivided into columns of
5 or 6 miles in length, and 3 or 4 in breadth; each line or
column being led, according to the ideas of fifteen men,
by herrings of more than ordinary size. The herrings swim
near the surface, linking occasionally for 10 or 15 minutes.
The fore-runner of those who visit the British kingdoms ap-
ppear off Shetland in April or May, and the grand body
begins to be perceived in June. Their approach is known
to the fishers by a small rippling of the water, the reflection
of their brilliancy, and the number of solan gannets, or gar-
nets, and other aerial perceptors, who are eager to devour
them and who, with the marine attendants, may forever
see the shoals of them into bays and creeks, where many
thousands of them are taken every night from June till Sep-
tember. Although the Shetland islands break and separate
the grand body of the herrings into two divisions, they still
continue their course towards the south. One division pro-
ceeds along the east side of Britain, and pays its tribute to
the Orkneys, the Murray forth, the coasts of Aberdeen,
Angus, and Fife, the great river Forth, the coast of Scar-
borough, and particularly the projecting land at Yarmouth,
the ancient and only mart of herrings in England, where
they appear in October, and are found in considerable quan-
tities till Christmas. The other division pursues its course
from the Shetland islands, along the west side of Britain;
and there are observed to be larger and fatter than those on
the east side. After pursuing the Shetland and the Orkney
isles, they crowd in amazing quantities into the lakes, bays,
and narrow channels of the shores of Sutherland, Ross, and
Inverness; which, with the Hebride islands, especially the
Long island, form the greatest stationary herring fishery in
Britain; that upon the coasts of Shetland excepted. Some-
times this shoal, in its southern progress, edges close upon
the extensive coast of Argyllshire; fills every bay and
creek; and visits, in small detachments, the firth of Clyde,
Lochline, and other lakes within the entrance of that river;
the coast of Arran, and of Galloway, to the head of the
Solway firth. This shoal proceeds from the western shores
of Scotland towards the north of Ireland; where, meeting
with a second interruption, they are again divided into two
brigades. One shoal passes down the Irish channel, visits
the isle of Man, and affords an occasional supply to the east
coast of Ireland, and the west coast of England, as far as
the Bristol channel. The other shoal skirts along the west
coast of Ireland, where, after visiting the lakes of Done-
gal, it gradually disappears, and is finally lost in the im-
meability of the Atlantic. Herrings, it is observed, are not
seen in quantities in any of the southern kingdoms, as Spain,
Portugal, or the south parts of France, on the side of the
Ocean, or in the Mediterranean, or on the coast of Africa.

"Were we inclined," says a well-known writer, "to
consider this partial migration of the herring in a moral
light, we might reflect with veneration and awe on the
mighty power which originally impregnated, on this most
useful body of his creatures, the instinct that directs and points
out their course, that blest and enables these isles,
which cause them at certain and invariable times to quit
the polar seas, and offer themselves to our expecting
feast."—"This impression was given them, that they
might remove for the sake of depositing their spawn in
warmeater, that would-mature and vivify it more affuredly
than those of the frigid zone. It is not from defect of
food that they set themselves in motion, for they come to
us full of fat, and on their return are almost uniformly ob-
erved to be lean and miserable. What their food is near
the pole, we are not yet informed, but in our seas they
feed much on the onions marin, a calausious insect, and
sometimes on their own fry. They are in full roe to the
end of June, and continue in perfection till the beginning
of winter, when they begin to deposit their spawn. Though
we have no particular authority for it, yet, as very few
young herrings are found in our seas during the winter, it
seems most certain that they return to their parental haunts
beneath the ice, to repair the vast destruction of their race
during summer, by men, fowl, and fish."

It has been generally supposed that the Hollanders were
the first who began the herring-fishery, and observed the several seasons of their passage. Their herring fishing is fixed to the year 1165. It is recorded, however, in the first life of Bishop de St. Ouen, that the herring was brought to the inhabitants of the Netherlands as early as the ninth century. This traffic laid the foundation of a commercial alliance between the two countries, which subsisted, to their mutual advantage, during many ages. Although many laws were enacted during the reigns of James III. IV. V. and VI. for recovering the fisheries of the eastern side of the kingdom, which the Dutch had encroached, greatly to the prejudice of the rightful owners; yet it is well known, that since the first establishment of the herring fishery, the Dutch have enjoyed the principal part of it, and it has very much contributed to their advancement and prosperity in former times. Our seas were their "original mines," as they themselves have acknowledged.

In the year 1313 we have an account of the seizure of a ship of Lynn, in the port of Bergen, which had been fishing on the Norwegian coast for herrings. (Rymer's F. vol. iii. p. 400.) And as landings of herrings carried to a distance must have been salted, it is plain that salted herrings, whether wet or else dried, called red herrings, were in those times a merchantable commodity in foreign parts. And in 1338 we have an account of fifty laths of herrings shipped from Portsmouth for the use of the army and fleet of Edward III. in Cafernay, which must have been salted, either wet or dried. (Fed. vol vii. p. 12.) And they were barrelled and salted at the port of Whitby in Yorkshire, in 1394. Fed. vol. vii. p. 778.

But the present method of pickling them was not discovered till the year 1416, though others date it from the year 1397. Willughby, in his History of Fishes, observes, that Will. Buckell's, or Bachalen, a native of Bier Ufflet, near Shays, who died in 1507, rendered his name immortal by the discovery of the secret of curing and pickling herrings, which he might probably have learned from the people of Yarmouth, and other parts of England, where herrings were not only salted and dried for red-herrings, but salted and barrelled up wet, at different times, from the year 1326 to 1350. Willughby says, that the emperor Charles V. coming to the Low Countries, made a journey to Bier Ufflet, with the queen of Hungary, that he might have the opportunity to view the tomb of this first barreler of herrings. It may be allowed, however, that Bachalen, or Benkelen, might have made some improvement in the practice; which his countrymen afterwards contributed to perfect. By their ingenuity and perseverance they reduced the whole business of the fisheries into a regular system, which it would be the interest of other states to follow. They have likewise been widely aided from time to time by their respective provincial legislatures, not only in every privilege and support, but also in a well digested body of laws and regulations, extending to the most minute circumstances, from the commencement of the out-lie to the export of the herrings.

Yarmouth has been long famous for its herring-fair, which was regulated by an act, commonly called the statute of herrings, in the thirty-first year of Edward III.

This politic monarch, with a view of promoting the herring trade, became a purchaser of their fish; and, in 1358, fifty laths of herrings were shipped from Portsmouth for the use of his army and fleet in France. This practice was adopted by his successors down to queen Elizabeth, who also enforced the ecclesiastical laws respecting the observance of Lent in favour of the fisheries. Indeed Yarmouth owed its rise to the fishery, for the place where it now stands was only a sand-bank in the sea, which in process of time became dry land, and drew thither fisher-men from various parts of England, and also from France and the Low Countries, for the purpose of catching herrings. The commencement of this fishery appears, from several concurring circumstances, to have taken place soon after the landing of Cerdic, the Saxon, in 495. (See YARMOUTH.) The Yarmouth herrings maintained their reputation, and the inhabitants were reckoned the best curers in Europe, so that the Dutch were in the number of their foreign customers. The Yarmouth people have greatly the advantage over the Dutch, in being nearer the herring shoals, and less in being plentifully supplied with wood; whereas the Dutch are obliged to smock their herrings with turf or saw. The fishery commences here about the twenty first of September, and continues till the twenty-fifth of November. The fishing grounds are from ten leagues N. of Yarmouth to the South Foreland. Their trunks or vessels carry from thirty to fifty tons, and each is equipped with 90 or 100 nets, which are replaced about the middle of the season by a fresh lot, of the same quantity and dimensions. Each fish is with a bell, for the purpose of being caught by a fort of machine, as soon as they are disengaged from the nets; the bottom of the well being full of holes, through which the blood and water are discharged. There are two apartments called wings, one on each side of the well, into which the men throw the herrings with scoops; a third throws in the salt, while a fourth and fifth throw up the herrings to the furthest part of the wings. By these means they are preferred till each vessel hath got in 10 or 12 laths, when the vessel returns to Yarmouth road, and the fish is removed ashore in small boats, and conveyed to the fish-house. Here they are salted on the floor, in which flate they lie for two days; they are then washed in large vats of fresh water, put on the spits, and dried with many fires of billet-wood. If the herrings are intended for exportation, they are kept in this flate from four to six weeks, when they are packed in casks of 52 gallons; each cask containing 1000 herrings. One half of salt cures three laths of herrings. This ancient fishery is now much on the decline; and the town has suffered much on this account.

The Dutch began their herring-fishery at the twenty-fourth of June, and employed no less than ten or eleven hundred vessels therein. These vessels are a kind of banks, called fijzenes, carrying from forty-five to sixty two, and two or three small cannon.

Before the establishment of the Society of the Free British Fishery, the number of Dutch vessels employed in this fishery was more considerable, and amounted to a hundred or two thousand.

None of them were allowed to fish out of port without a convoy, unless there were enough of them together to make eighteen or twenty pieces of cannon; in which case they were allowed to go in company. Before they left, they made a verbal convention; which had the same force as if it were in writing.

These regulations of the admiralty of Holland were partly followed by the French, and other nations, and partly improved and augmented with new ones; so that no fisher should sell his net within an hundred furlongs of another boat; that while the nets were on board, a light should be kept on the third part of the vessel; that when a bell was by any accident obliged to leave off fishing, the light should be cast into the sea; that when the greater part of a fleet left off fishing, and call anchor, the red should do the same, &c.

By the act for encouraging the British white herring-fish.
ery, in 1750, it is required, that the busses employed in this fishery, entitled to the bounty of 30s. per ton, shall be decked vessels, built in Great Britain, after the commencement of the act; and that each of them shall carry twelve Whinchester busses of salt, for every half of fish which such vessel is capable of holding; and as many more barrels as such a ship is capable of carrying, and two fleets of haired nets, &c. every vessel of some tons shall have one fleet of nets, every thirty yards full on the rope, and seventeen fathoms deep, and others in proportion; and be provided with one other fleet of fifty like nets, on board a jagger or tender, which is to attend the said fishery. Every such busses properly manned and furnished, shall proceed either to Braffey's Sound in Shetland, and he at the rendezvous of the said fishery there, on or before the eleventh day of June, and shall not shoot their net till the thirteenth, and shall continue following the shoal and fishing, as they move southward, to the first of October; or to Campbeltown in Argyle, and be at the rendezvous of the said fisheries on or before the first day of December, unless they shall have sooner completed their loading of fish.

By 26 Geo. III. c. 81, continued by a subsequent act, a bounty of 20s. per ton shall be paid annually to the owner of every decked vessel, not less than fifteen tons burden, manned and navigated according to law, employed in the British whale fishery, subject to certain regulations, and with the alterations made by 42 Geo. III. c. 79. Every busses or vessel to be entitled to the above bounty shall be built in Great Britain, and have on board (in new barrels) twelve busses of salt for every half of fish, which such ship can carry, and also 250 square yards of netting, and not less than five men for the first 15 tons, and one additional man for every additional five tons; and shall clear out from some port in Great Britain between June 18th and November 20th in the same year, and proceed immediately to the said fisheries, and continue fishing three months, unless its cargo be completed. On its return the officer of the customs shall examine the condition and lading of the ship; and after other documents being produced the commissioners of the customs or excise in Scotland, shall cause payment to be made to the owner or owners, or his or their assigns, the sum of 20s. per ton, according to the measurement of such busses or vessels. For every barrel of herrings twice packed and completely cured, which shall, during one year, be landed from any vessel not entitled to the aforesaid bounty per ton, there shall be a bounty of 4s. But if the number of barrels of herrings imported shall, in one year, exceed the proportion of 22 barrels of herrings, packed and cured as aforesaid, for every ten burden of such vessel, then there shall be paid for every barrel exceeding the said proportion a bounty of 1s. only. For all herrings which shall be landed from any boat or vessel not entitled to the bounty of 20s. per ton, and which shall afterwards be properly salted and cured, there shall be paid a bounty of 6d. per barrel. For the encouragement of the fishery, called the Deep Sea fishery, over and beyond the bounties before granted, there shall be paid the following premiums; i.e., for the greatest quantity of herrings caught by the crew of any one vessel, entitled to the aforesaid bounties of 20s. per ton, and 4s. and 1s. per barrel, and imported by such vessel between June 18th and November 31st in any one year, the premium of eighty guineas: for the next greatest quantity sixty guineas; and for the next forty guineas; and for the next twenty guineas. By 56 Geo. III. c. 81, the ears of fish in Great Britain were allowed to take salt, for the purpose of curing fish, but by the 36th of Geo. III. which subjects salt to the excise duties, and enacts new regulations, this act may be considered as virtually repealed, at least as to its principal clauses. There are other provisions included in the laws, 27 Geo. III. c. 15. 33 Geo. III. c. 56, all which provisions and powers contained in preceding acts are revived by 42 Geo. III. c. 79, except as to the bounties, which bounties by this act are as follows: From the 5th of April 1807, one-half of the bounty of 20s. per ton, and one-half of the bounties granted by the preceding acts for every barrel of herrings landed from any raft or vessel, in respect of which a bounty of 20s. per ton is granted by the said acts, shall cease and determine. For other regulations of the herring fishery, see HERRING.

The manner of fishing has nothing particular in it. The nets wherein the fish is drawn should regularly have their meshes an inch square, that none of the fishery may be taken.

The commerce of herring, both white, i.e., pickled, and red, is very considerable; but there are so many different ports, prepared in such different ways, and different places, that it is hard to say any thing precise thereupon.

The white herrings cured by the Dutch used to be in the greatest repute; they were distinguished into four kinds, according to their sizes. The good sorts of this commodity contain in their coat fat, fatty, firm, and those of 42 Geo. III. caught but when in season, chiefly in the month of July; being taken alive out of the nets; being salted the same day it is taken, and with good salt, and well barrelled.

The Irish herrings have been esteemed the next in value after those of Holland; and principally those of Dublin, which are scarce inferior to the best herrings of Rotterdam or Enkhuizen.

It was about the year 1754, that the Irish parliament began to frame such laws, and to grant such aids as the nature of the fisheries suggested. The principal fisheries of this country are in Loch Sull, the Roffes, Killebegs, and Inverbay, on the coast of Donegal; and an inferior kind of herrings is occasionally taken on the coast of Sligo and Mayo, as far southward as Bredhaven. The fishery at Inverray begins in July, and continues till the beginning or sometimes the end of September. The other fisheries commence in November, and end in January. The herrings taken by the British vessels are preferred, on account of their being gutted, and cured in barrels of 32 gallons. The Irish uncutted herrings, on the other hand, are in some parts of the coast fished in holes dug in the earth, till the herrings have an opportunity of falling them to the busses; they are then packed or piled up in the hold of the vessel, and are thus carried to Cork, and other ports, when they are put into barrels of 32 gallons, and exported to the West Indies. Of the winter herrings taken in Loch Sull, 500 will fill a barrel; and of the early herrings, 800. The busses are from 20 to 100 tons burthen, and are under certain parliamentary regulations, respecting netting, and the number of men. The nets are tamed with a mixture of tar and fish oil, in the proportion of five parts of tar and one of oil; and improvements have been made in the method of working the nets.

The Scotch herring is not so well prepared, gutted, filled, or barrelled, as the Dutch; and yet its talle is excellent, that of those caught on the western coast especially; nor is it to be doubted, but that if the Scots were as careful in these circumstances as their neighbours, their herrings would be the best in the world.

The whole coast of Scotland may be considered as one continued
continued fishery, distinguished, however, by the names of the Shetland, or northern fishery, that on the east side of the kingdom from the Pentland firth to Berwick, and the western or Hebridean fishery. The principal town on the Shetland islands is called Lerwick, situated on a narrow channel of the Main-land, called Braith or Braich-bound. Either the Dutch and other foreigners have been accustomed to refer to the fisheries at the appointed feasons, when Lerwick hath had all the appearance of a continued market on fair. The eastern fisheries along the eastern shores of Scotland, though less considerable than those on the coasts of Shetland, might with proper attention be of great national benefit. But though the whole line of coast from Caithness to Berwick is the occasional resort of herrings, in their autumnal voyage southward, yet in this course of 300 miles, (including the Murray firth,) there is not a fixed or stationary fishery, such as that at Yarmouth, Dealeng, and Gottenburgh, where the herrings arrive almost to a certainty, and generally at the same period of time. The shores on the eastern side of Scotland, that have been most generally explored, and that have produced the greatest quantity of herring, are those of the Forth and the Murray firth. The herring fishery in the Forth was conducted formerly by open boats, which amounted to the number of 6 or 800, and many thousand barrels of herrings were annually exported, besides supplying the home demand. The coast fishing on the Murray firth was conducted on the same plan, governed by the fame regulations, and proportionally benefited to that populous, though remote part of the kingdom. It employed from 5 to 700 boats. These fisheries, at present, in a low state, might be extended to any degree; and also the deep water fishery, to the distance of 20 miles from the coast, where the herrings are larger and fatter than those taken in the Forth, or near the shores, and are nearly equal to the herrings taken in deep lochs of the West Highlands. This deep water fishery should be carried on by buffets or decked vessels, from 20 to 80 tons burden, which ought to be at the Shetland islands early in the feafon, and the produce should be speedily carried to the proper markets; whilst the buffets may continue the fishery down the channel till the end of the feafon. In this manner the markets would be confantly supplied, greatly to the benefit of the merchant, the buffers, and the labouring poor, along the whole coast. The Hebridean, or western fishery, was frequented in very early times by the French and Spaniards, who trafficked with the natives for fish; whence we may conclude that the natives were buffers, and that foreigners were the carriers. It is probable that the fishery was then carried on by little open boats, or berlins, such as the Highlanders generally ufe at the present day. This fishery was the thoroughfare, as we may call it, of the great western fish of herrings, in their annual tour from the Shetland islands to Ireland, which, in the opinion of some writers, they environ, and from whence they return by the opposite channel, in the fame manner as the eastern fishers environ Great Britain, and return north by the western channel. This Hebridean fishery, confidering the manner in which it was conducted, may be juftly fied the school of navigation; and on this account, as well as for its produce, deserves British encouragement. As a nursery of Seamen, the boat fishery will exceed that of the buffets with regard to numbers of persons employed; but, on the other hand, it cannot be put into competition with the buffets in respect of nautical knowledge.

The herring fishery in England is inconsiderable; the fish being too dry for the market. However, at Yarmouth and Lowestoff they have in former times taken and cured about 50,000 barrels of red-herrings in a year; and very large quantities are also caught at the mouth of the Thames by the fishing-smacks of London, Folkestone, Dover, Sandwich, &c. for the London markets, and near the sea-coast of Kent and Suffolk for general consumption. Some shoals are also forced, by the great swell of the Atlantic, into the Bristol channel, and particularly into the Bay of Barfplain, where they have been sometimes taken and cured for exportation, in very considerable quantities.


ging and preparing herrings.—1. For white or pickled herrings: as soon as the herrings are taken out of the sea, one of the crew, appointed for this office, cuts them open, and takes out the guts, and every thing but the milts and roes, which are always to be left in the body of the fish. Then washing them in fresh water, they are left the space of twelve or fifteen hours in a tub full of strong brine made of fresh water, and sea-falt.

When they are taken out, they drain them; and when well drained, put them up in barrels; taking care to dispose and range them evenly, in rows, or layers, pressing them well down, and flrewing a layer of salt both at top and bottom.

When the barrel is full, they flop it up very clofe, that no air may get in, nor any brine out; either of which is very prejudicial to the fish.

The Dutch, after opening and gutting the herrings, cure and salt them by blying or rubbing their inside with salt; they are then packed, with handfuls of salt between each row, and flapped up clofe.

2. For red-herrings: the fish being caught, they proceed to wash, gut, and lay them in brine, as for pickled herrings; only they let them lie double the time in brine, viz. twenty-four hours; insomuch as they are to take all their salt here, whereas the other kind takes half its salt in the barrel.

When the herrings are taken out of the brine, they spit them, i.e. firing them by the head on little wooden spits, and thus hang them in a kind of chimney, made for the purpose; and when the chimney is as full as it will hold, which lasts less than ten or twelve thousand flemoh effects, they make a little fire underneath, of bruffh-wood, which yields a deal of smoke, but no flame.

Here the herrings remain till sufficiently smoked and dried; which ordinarily is in twenty-four hours. They are then taken down and barrelled up for keeping.

Their goodness consists in being large, fresh, fat, oily, soft, and pliable, their outside of a yellow, golden colour; their having roes or not, within them, and being well salted and barrelled. See HERRING.

Fishey, Line. This fish abounds near the Scilly isles, and on the Yorkfhire coast. In the latter situation they are in perfection from the 1st of February to the 1st of May, and some till the end of that month. In June they spawn, depositing their eggs in the soft oozy ground of the mouth of the Tees. At that time the males separate from the females, and return to some rocky ground near Flamborough Head, where the fishermen take great numbers without ever finding any of the female or road fish among them. While a ling is in season its liver is very white, and abounds with a fine flavoured oil; but when the fish goes out of season the liver becomes red, like that of a bullock, and affords no oil. When the fish is in perfection, a very large quantity of oil may be melted out of the liver by a fome heat; but if a violent sudden heat be used, for that purpose they yield very little. Great quantities of ling are cured for exportation, as well as for home consumption. When it is set or split for curing, it is stuffed with each other upwards from
the shoulder to the tail; if less than that, it is not reckoned a sizeable fish, and consequently not entitled to the bounty on exportation; such are called drizelles, and are in season all summer. The usual size of a ling is from three to four feet; but some have measured seven feet.

Fishery, Lobster. Lobsters are taken along the British channel, and on the coast of Norway, whence they are brought to London for sale; and also in the frith of Edinburgh, and on the coast of Northumberland.

By 10 & 11 W. III. cap. 25, no lobster is to be taken under eight inches in length, from the peak of the nose to the end of the middle fin of the tail; and by 9 G. II. cap. 33, no lobsters are to be taken or destroyed on the coast of Scotland from the first of June, to the first of September, on pain of 5l.

Fishery, Mackerel. The mackerel is a salt-water fish, without scales. Its body is round and fleshy; terminating almost at a point, at each extreme. Some persons, well skilled in naval architecture, hold its figure the most commodious for swimming of all others, and propose it as a model for the building of ships.

It is ordinarily about a foot long; when in the water it appears yellow, and when out of it a silver white, excepting four streaks, or speckles, of a deep blue, on the back and sides. Its usual weight is about two pounds. During winter a film grows on the eyes of this fish; in the spring they are half blind; and in summer the film is off. See Mackerel.

The mackerel is a summer fish of passage, found in large shoals in divers parts of the ocean, not far north; but especially on the French and English coasts.

The fishing is usually in the months of April, May, and June, and even July, according to the place. They enter the English channel in April, and proceed up to the offshores of Dover, and the mouth of the Thames, as the summer fisheries; so that by June they are on the coasts of Cornwall, Suffolk, Normandy, Picardy, &c. where the fishery is most considerable. An inferior fish is also taken during the harvest months. They are an excellent food, fresh, but their taste and flavor are much impaired a few hours after they are taken; and not to be despised when well prepared, pickled, and put up in barrels; a method of preserving them chiefly used in Cornwall.

Naturalists have observed, that the water wherein mackerel have been boiled, often yields a light, after stirring it a little. See Fish, and luminous stuff of the Sea.

The fish is taken in two ways; either with a line, or nets: the latter is the more considerable, and is usually performed in the night time. The rules observed in the fishing for mackerel are much the same as those already mentioned in the fishery of herrings.

There are two ways of picking them: the first is, by opening and gutting them, and filling the belly with salt, crammed in as hard as possible with a stick; which done, they range them in flara or rows, at the bottom of the vessel, drawing falt between the layers.

In the second way, they put them immediately into tubs full of brine, made of fresh water and salt; and leave them to steep, till they have imbued salt enough to make them keep; after which they are taken out, and barrelled up, taking care to press them close down.

Mackerel are not cured or exported as merchandise, except a few by the Yarmouth and Lowestoff merchants, but are generally consumed at home; especially in the city of London, and the sea-ports between the Thames and Yarmouth, east, and the Land's End of Cornwall, west. By that 35 Geo. III. c. 54. the curers of mackerel in Great Britain may import any quantity of foreign salt, or take any quantity of British salt, from any salt-works and salt-pits, and remove coast-wise the salt so imported, or taken for the purpose of curing mackerel (or any cod, ling, hake, or salmon, being taken in the mackerel fishery) for home consumption, duty free, except the customs due on importation, in as full a manner as the herring and pilchard fishery are enabled to do for home consumption. For every barrel of white mackerel, twice packed, and completely cured, containing 32 gallons, which shall be exported from Great Britain into any parts beyond seas, (except into any part of the Mediterranean) a bounty of 2s. 6d. shall be paid; and for every barrel of mackerel which shall be landed from any boats or vessels, and which shall be properly salted and cured, shall be paid a bounty of 4d.

Fishery, Oyster. It principally carried on at Colchester, in Essex; Prertherham and Milton, in Kent; the Isle of Wight; the Swales of the Medway; and Tenby, on the coast of Wales. From Prertherham, and adjacent parts, the Dutch have sometimes loaded a hundred large hogs with oysters in a year. They are also taken in great quantities near Portsmouth, and in all the creeks and rivers between Southampton and Chichester; many of which are carried about by sea to London and to Colchester, to be fed in the pits about Wavenhoe, and other places. By 31 G. III. c. 51. if any person shall within any net, trawl, dredge, or any other engine, take or catch any oyster or oyster brood, within the limits of any oyster fishery in this kingdom, or use any such engine for the purpose of catching oysters or oyster brood, though none be taken; or drag upon the ground of any such fishery with any net or other engine; every such person, except the owner, lessee, or occupier of the said fishery, or person lawfully entitled to catch oysters therein, shall be deemed guilty of a misdemeanor, and may be indicted at the assizes or quarter sessions for the county or division; and every such offender being convicted by verdict before the justices in sessions, or on his own confession, may be punished by fine and imprisonment, or either of them, as the court may think proper; such fine not to exceed 2l., or be less than 40s.; and such imprisonment not to be for more than three months, nor less than one month. Offenders may be apprehended by warrant of any justices, who may commit them to the common gaol or other prison, until the next assizes or quarter sessions, unless they enter into recognizance with two sureties in 20l. each to appear and answer to such indictment, &c. See Oyster.

Fishery, Pearl. See Pearl fishery.

Fishery, Pilchard. The pilchard is a small salt-water fish, bigger than the anchovy, but less than the herring, which in other respects it resembles. Its head is yellow; its belly white; and its back a green. It is excellent when fresh, or lightly salted. See Pilchard.

There are several reasons for fishing the pilchard; which, like the herring and anchovy, is a fish of passage from the northern latitudes; and its arrival is indicated by similar signs with those of the herring. They are prepared and fished much as the anchovy is; with this difference, that the head is cut off at the latter: but the pilchard is distinguishable from the anchovy, even though its head were off likewise: the pilchard having a very flat back, and the anchovy a round one.

The chief pilchard fisheries are along the coasts of Dalmatia, to the south of the island Ziza; on the coast of Bretagne, from Belle island as far as Breizh; and along the coasts of Cornwall and Devonshire, when they appear about the middle of July, and range between Fowey harbour and the
the Scilly islands about September; some few occasionally returning after Christmas.

It is a saying of the Cornish men, with regard to the pilchard, that it is the least fish in size, most in number, and greatest in gain, of any they take out of the sea. This observation is amply confirmed by Dr. Borlase's account of this fishery; for besides the great number of persons employed by it, the poor are fed with the offals of the captures, the land with the refuse of the fish and flesh, the merchant finds the gains of commission and commerce, and the fisherman the gains of the fish. The usual produce of the number of hogsheads exported each year, for ten years, from 1747 to 1757, inclusive, from the four ports of Fowey, Falmouth, Penzance, and St. Ives, amounted to 29,793 hogsheads. Every hogshead for ten years last past, together with the bounty allowed for each hogshead exported, and the oil made out of each, has amounted, one year with another, at an average, to the price of 19,135, and 30; so that the cash paid for pilchards exported has, at a medium, annually amounted to the sum of 49,532/. 10s. The number taken at one shooting out of the nets is amazingly great. In 1757, there were at one time inincled in St. Ives's bay 7000 hogsheads, each hogshead containing 35,000 o fish; in all 240,000,000.

That on the coasts of Dalmatia is so plentiful, that it not only furnishes all Greece, but a great part of Italy. That fish the coast of Bretagne has employed yearly above three hundred thousands, and most of the feamen of the country.

The fish caught on our own coasts, though bigger, are not so much valued as those on the coasts of France; owing principally to their not being so thoroughly cured.

The season is from June to September.

The pilchards, like the herrings, naturally follow the light, and will gather about a boat that bears a light in the night time; which contributes much to the facility of the fishery.

On the coasts of France they make life of the roes of cod-fish as a bait; which thrown into the sea makes them ride from the bottom, and run into the nets placed for that purpose.

On our coasts there are perfons, called in Cornwall buxte, poled ashore, who, fypping by the colour of the water where the fhools are, make ligns to the boats, to get among them, to call their nets.

When taken, the fish are brought to a warehouse on shore, where they are laid up in broad piles, supported by backs and sides.

As they pile them, they salt them with bay-leaf; in which they lie soaking twenty or thirty days, and discharge a great quantity of blood, with dirty pickle, and bittern; which latter draws much of the oil from the fish, to the great loss of the owners. When taken out of the pile, there remains a quantity of salt, blood, scales, &c. at bottom, which, with fresh salt, makes for another pile.

They now proceed to wash them in sea-water to clear off the dirt and blood; and, when dry, they put them up in barrels, and press them hard down to squeeze out the oil, which issues away at a hole in the bottom of the casks; and in this state they are fit for sale or use.

Fishery, Salmon. The salmon is a northern fish, occupying the European seas, the latitudes lying between France and Greenland, being unknown in the Mediterranean sea, and other warm climates, and, according to some, breeds in the sea; but the opinion of others seems better warranted, that it breeds in the clear fresh parts of rivers, remote from their mouths. They commonly spawn in November; and when they have found a place fit for the purpose, the male and female unite in forming a proper receptacle for it in the sand or gravel, about the depth of eighteen inches; in this the female deposits her spawn, and the male his milt, which they cover carefully, as it is laid, with their tails; for after spawning, they are observed to have no skin on that part. The spawn lies buried till the spring. The milter and spawn, having performed their office, betake themselves to the sea; and if their route is prevented by rivers, or the like, they become sick, lean, and are then called fitter, pine away, and die in two years time. If they spawn in the mean time, the produce is a diminutive salmon, called fry, which will never arrive at the natural bulk; it being the fish that makes them grow big, and the rivers fat. The female is distinguished from the male, in that its nose is longer, and more hooked, its scales not so bright, and its body speckled over with dark brown spots, its belly flatter, and its flesh not so red; more dry, and less delicious to the taste. In spawning time, when they repair from the sea up to the rivers, scarce any thing can stop their progress. Many have seen them leap up cataracts and precipices many yards high. They will ascend rivers 500 miles from the sea, and force themselves against the most rapid streams. They are frequently taken in the Rhine as high as Basile in Switzerland; they gain the sources of the Laperland rivers notwithstanding their strong torrents; and mount the perpendicular fall across the Liuffi, at Leispil, 7 miles above Falmouth, though nearly 50 feet in height. As soon as they come to the bottom of the cascade, they make a violent, and often meeting the obstruction, and retire some paces back; then they review the danger that affails them, ferry it without motion, advance, and again retreat; till at last, fome of the salmon become over all their force, they take a leap from the bottom, with the body quite straight, and with a strong tremulous motion; and they most frequently clear every obstruction. It sometimes happens, however, that they want strength to make the leap, in which case they are entangled in their defence by baskets placed on purpose, from which they cannot escape. The shooting of salmon, in their leap, is sometimes practised for amusement. See SALMON.

When the salmon first enter the fresh water, they have a number of infects, the hero, falmones of Linnæus, adhering to them, especially above the gills, which are sanguine that the fish is in high feaon: these die and drop off soon after the salmon have left the sea. About the latter end of March the spawn begins to exclude the young, which gradually increase to the length of four or five inches, and are then termed smelts or smoute; and about the beginning of May the Twed, &c. is full of them, but they are soon hurried away to the sea. About the middle of June, the earlies of the fry begin to drop, as it were, into the river again from the sea, being about twelve, fourteen, or sixteen inches, and they gradually increase in number and size till about the end of July (at Berwick the fish in this stage is called gille); when they again begin to increase in size, some being, in August, thirty, twenty-eight, or nine pounds in weight.

The chief salmon fisheries are along the coasts of England, Scotland, and Ireland. The fishing usually begins about the first of January, and ends by the last of September. It is performed with nets, in the places where the rivers empty themselves into the sea, and along the sea coasts thereabout. The fish are keen to crowd thither frequently in shoals from all parts in search of the fresh water; they go fish for them higher up in the rivers; sometimes with nets, and sometimes with a kind of locks, or weirs, made for the purpose, with iron grates therein, so disposed, as that...
that the fish, in going up the river, open them with their head; but are no sooner entered than the gate claps to. Thus the salmon are included as in a retort, where it is easy to take them. In some places they fish for salmon in the night time, by the light of torches, or kindled straw. The fishermen watch when the fish draws towards the light, wherein he bears a single lead, and strikes him with a spear or lid. In some parts of Scotland it is said, they ride a fishing up the rivers, and, when they spy them in the shallow parts, shoot them with fire-arms.

Salmon form, in several countries, a great article of commerce; being cured in different ways, by salting, pickling, and drying. There are stationary fisheries in Iceland, Norway, and the Baltic; but those at Coleraine in Ireland, at Berwick in Great Britain, and in some of the rivers of Scotland, are the most considerable. The capture in the Tweed near Berwick, about the month of July, is prodigious; a boat load, and sometimes near two, are taken in a tide; and it is common to take from fifty to a hundred fish at one haul. At this time the cooper in Berwick begin to file both salmon and gilfe in pipes, and other large vessels, and then barreling them to send abroad. The salmon barrel holds above forty-two gallons, wine measure. Most of the salmon taken before April is sent fresh to London; and that which they fail to send is boiled, pickled, and kitted. Fresh salmon has also been seen in London at the latter end of September; but then the fish are full of large roes, very tender, and are esteemed neither palatable nor wholesome. In the month of July a score of fresh salmon, of eighteen pounds ten ounces and a half, has been sold at Berwick for eighteen pence; but the more common price is between fifteen-pence and two shillings and six-pence. The season for fishing in the Tweed begins the thirtieth of November, though the fishermen work very little till after Christmas, and ends on Michaelmas day. There are on this river forty-one considerable fisheries, besides others of less value, which formerly rented for near 54,000 per annum.

Scotland possesses also great numbers of fine fisheries on both sides of that kingdom. The salmon are cured in the same manner as at Berwick; and a great quantity is sent to London in the spring; but after that time the adventurer begins to barrell and export them to foreign countries; though the demand for them is much abated of late years. They have also in Scotland a great deal of salmon, salted in the old-fashioned way; rich, after soaking in brine for a compulsive time, is well preserved, and is not injured in smoke; this is called upper, is chiefly made for home consumption, and, if properly cured and prepared, is reckoned very delicious food. The great fisheries are those of the Tweed, the Forth, the Tay, the Dee, the Don, the Spey, the Findhorn, the Nith, the Braile, and thence northward to Dungibay head, the coast of the Pentland firth, the coast from Cape Wrath to the Mull of Cantire, all the Hebride islands, and the coasts of Ayrshire, Galloway, and the Solway firth, where the rivers, bays, or lakes are open. The season of fishing at Aberdeen is from the 30th of November to the 8th of September; but few fish come into the rivers before the 15th of January, from which time to the middle of May, the salmon are boiled and killed for the London market, and sent off almost every week, by swift falling blogs, called smacks, retained for the purpose. Those that are caught through the summer are salted for foreign exportation. No salmon is allowed to be barrelled and cured, except by the town's cooper, who are required to put the initial letters of their names on their barrels; nor can they be shipped for exportation till the letters A. B. D. have been burned on each barrel, by an officer appointed for that purpose. No fish that hath been bit by seals, none under a certain fixed weight, nor any that have been damaged in the carriage from the river, are to be put into a barrel, without having the word rebate burned on the end of the cask. The barrels are of a fixed size, containing about 250 pounds of fish, so carefully packed that they do not differ a pound of fish from one another. After they are packed from the nets in which they have been salted, great care is taken to keep them brim full of pickle, till the bungs are fixed down, a day or two before they are shipped. By this attention the Aberdeen salmon hath acquired such a character abroad, that it generally fetches the highest price, and no questions are asked respecting the quality.

The north of Ireland abounds with this fish; the most considerable fishery is at Cranna, about a mile and a half from Coleraine, rented, in 1754, for 620l. a year. It is situated on the river Bann, where they fish with nets eighteen foor yards long, and are continually drawing night and day through the whole seafon, which lasts about four months; eight hundred and forty fish have been taken at a single draught. There is also a weir on the river, which takes the fish that escape the nets. In 1760, three hundred and twenty tons were taken in the Cranna fishery. The salmon are cured in this manner: they are first split, and the guts and gills, and many of the bones, are taken out, and then rubbed with fine salt; and after lying in pickle in large tuns for six weeks, are packed up with layers of coarse brown Spanish salt in casks, fix of which make a ton. These are exported to Leghorn and Venice, &c. at the price of twelve or thirteen pounds a ton. Pennant's Brit. Zool. v. iii. p. 284. 294. See a further account of this fishery under Coleraine.

The 4th & 5th Anne, cap. 21, was made for the increase and preservation of salmon in rivers in the counties of Southampton and Wilts, requiring that no salmon be taken between the first of August and the twelfth of November, or under size, &c. And by 1 Geo. I. cap. 18, salmon taken in the rivers Severn, Dee, Wye, Were, Onye, &c. are to be eighteen inches long, at least; and the nets shall not be less than 15 inches in the mesh; nor shall any salmon be sent to London out of the said rivers under six pounds weight; or the persons catching them shall forfeit £5. This statute contains several other regulations. And by 30 Geo. II. cap. 28, no salmon is to be caught in the rivers Thames and Medway between the eleventh of November and twenty-fourth of August, or to be of less weight than six pounds.

Salmon is also fished for in rivers, after the manner of trout, with a line and hook. He bites bet in the afternoon, about three, in May, June, July, and August; the water being clear, and a little breeze of wind stirring; especially if the wind and stream set contrary ways. The salmon is caught like a trout, with worm, fly, and minnow; and especially the garden-worm, if well secured, and kept twenty days in moss. The salmon never stays long in a place, but is continually shifting to be as near the springhead as possible, and swimming generally in the deepest and broadest parts of the rivers, near the ground. Put two or three garden-worms well secured on your hook at once, as if you were baiting for trout; and be sure to give him time to gorge his bait, before you strike. Some use a wire ring on the top of the rod, through which the line may be let run to any length at pleasure, by a reel near the land.

Fishery, Scot, &c. The fishery for seals is very productive.
The skin of the seal is tanned and made into shoes, commonly called dogskin shoes; it also serves for the bottoms of chairs, and for various other purposes. The oil is used in chambers, and falls at a much higher price than that of the cod-fish, which is burned in street-lamps. The greatest seal fishery is on the coast of Labrador in North America. The boats used in the cod-fishery of Newfoundland are about 50 feet in length, decked at both ends; they have two masts, and a short bow-sprit; they are built of fir or spruce, and will fail, as the seamen say, in the wind's eye. In the winter season, when the Newfoundland cod-fishery is finished, these boats, with 50 to 70 men in each, repair to the frozen shores of Labrador, where the winds and tides often drive immense floats of ice into the bays, and on these floats a great number of seals. As the boats belong to different merchants, the float of ice is marked out in equal portions, and each boat's crew is strictly limited to the part assigned them. Having settled these regulations, they attack the seals in their respective departments. The first man of the party advances towards a seal, which he strikes immediately above the nose with a club; then attacks another and kills it; and marches forward to a third, which he also kills. Thus advancing, the whole field of ice becomes a scene of blood, strewed with dead seals. When the first seal is killed, the next person in rank tears off the skin, which he leaves on the spot, and advances to the second, and so on. A third person takes a layer of fat, with which the seal is covered next the skin, which he leaves on the spot, and immediately follows the two others. Thus the killer, the layer of skin and of fat, with the remaining crew, will sometimes clear to the value of 500£. within the interval of 24 hours. When this happens, they return with what they call a full cargo, which abundantly reimburses their employers. The seal-fishing in Scotland is in some respects similar. The Scottish seals are open through the whole year, and the seals, being of the amphibious kind, frequent the coves and openings of the rocks upon the shore, where they bring up their young. The Hebrides, and the northern shores of the main land, are the principal resort of the seals. On the western coast of North Uist, a part of the Long Island, lies the rock Conamail, about a quarter of a mile in circumference, which is still famous for the yearly fishing of seals there the end of October. This rock belongs to the farmers of the adjacent lands; one of whom furnishes a boat, to whom a particular share is due on that account, besides his proportion as a tenant. The minnister, rector, and subordinate officers have their shares by virtue of their respective offices. The farmers man their boats with a competent number of persons; and when the crew are landed, a signal is given for a general attack, the pairs being surrounded, and they beat down the seals with their flaves. The seals on this occasion make towards the sea with full speed, and often force their passage over the necks of the routs, although always aim at the foreheads of the seals, giving many blows before they are killed; and sometimes the seals lay hold of the seals with their teeth, and carry them away to the sea. These are in the boat shot at them as they run to sea, but few are caught that way. Some of the largest seals lose their lives by endeavouring to fave their young, which they tumble before them towards the sea, and in this act they are cruelly knocked on the head with sticks or flaves. Three hundred seals, it is said, have been killed at one time in this place. They are attacked in October, because in the beginning of this month they bring forth their young on the west side of these islands; but their on the east side are of a smaller nature, and bring forth their young in the middle of June.

The seals eat no fish till they first take off the skin; they take hold of the skin between their teeth, and pluck the skin off each side with their sharp-pointed nails. The natives say that the seals are regularly coupled, and reft at each other in a most extraordinary rate. It is said that the seals make their mutual addresses by salutations; and the female puts away its young as soon as it is able to provide for itself, in doing which it recovers many fewble blows. In the skin of the females there is a hole, within which the teats are secure from injury, as it creeps along the rocks and flones; and on this account nature has formed the point of the tongue cloven, in order to enable the young to suck. The natives find the seals with the ashes of burnt sea-ware, and say they are good food. The vulgar eat them commonly in the spring, and use a long pointed stick instead of a fork, to prevent the strong smell which their hands would otherwise retain for several hours afterwards. This four-footed creature is reckoned one of the twiflet in the sea; and it is likewise said, that in cold weather it will leap to the height of a pike above water; that the skin of it is white in summer, and darker in winter; and that its hair stands up with the wind, and falls again at the ebb. The natives cut the skin in long pieces, and use them as ropes to fix the plough to their horses when they till the ground.

The bairning sharks are supposed to be migratory fishes from the Arctic circle; they frequent the coast of Norway, the Orkney and Hebride isles, the forth of Clyde, the bay of Ballyhannin in Ireland, and the west coast of Wales, particularly Carnarvonshire and Anglesey. They appear in the forth of Clyde, near the isle of Arran, in small schools of seven or eight, but more generally in pairs, some time in June, and remain till the end of July, when they disappear. Although they are in size from 10 to 20 feet in length, they are so tame and stupid, that they will suffer themselves to be fwatered in the water. They lie on the surface, sometimes on their bellies, and sometimes on their backs, as if they were asleep. When the harpooner strikes his weapon into them, which he does as near the gills as possible, and they perceive themselves wounded, they fling up their tail and plunge headlong into the bottom, following the rope round them in their agonies, and attempting to disengage the harpoon by rolling on the ground. As soon as they find that their efforts are ineffectual, they swim away with such rapidity and violence, that a vessel of 70 tons has been towed away by them against a fresh gale. They sometimes run off with 200 fathoms of line, and with two harpoons in the body; and will contend for 24 hours before they are subdued. When they are killed, the liver, which is the only useful part, is taken out and melted in kettles provided for that purpose. A large fish, particularly the female, will yield eight barrels of oil, two of useless sediment, and afford a profit of 20/. The oil is of the most valuable kind, being pure and sweet, extremely proper for lamps, and much valued by tanners. It is also used by the fishermen for curing burns, bruises, and rheumatic complaints.

The catching of fish is a kind of defensive fishery. These animals, though scarcely exceeding the size of a large cod, are equally destructive to nets, and to all the species of fish which they can overcome. They had become so offensive on the coasts of Newfoundland and Labrador, that the enraged fishermen made war upon them as a common enemy, and with such success, that they have almost extinguished the whole species of the American shores. They abound on the coast of Shetland, particularly the Hebrides, where they
are taken in considerable numbers. Being split and dried, they are conveyed by the women through different parts of the country, and sold or exchanged for necessaries; these forming a petty inland commerce.

Fishery. Sturgeon. The sturgeon is a large sea-fish, which at its season runs up the rivers; having a sharp-pointed snout, a flat belly, and bluefish back. Sturgeons, as well as whales, are reckoned among the number of royal fishes.

There are sturgeons of all sizes; and we even read of some twenty feet long; but the middle size are reckoned the best; though some prefer the smaller. See Sturgeon.

It is of the roe or eggs of this fish that the caviar, or caviar, so much prized by the Italians, &c. is prepared. See Caviar.

Sturgeon, when fresh, eats deliciously. To make it keep, they salt or pickle it in large pieces, and put them up in casks, from twenty-five to fifty pounds.

The greatest sturgeon fishery in the world is in the mouth of the Volga, in the Caspian sea; where the Muscovites find employment for a great number of men. We have also had a considerable supply of sturgeon from North America, which rivals that of the Baltic.

They are not caught in nets, but in a kind of enclosure, formed by huge flakes, disposed in triangles, representing the letter Z several times repeated. These kinds of fishers are open on the side towards the sea, and close on the other; by which means the fish, ascending in its season up the river, embarrasses itself in these narrow angular retreats; and not being able to turn itself, to go back again, on account of its bulk, is easily struck, and killed with a fort of harping-iron. They are also taken during summer, in the lakes Frischehaff and Courischeaff, near Pillau, in large nets, made of small cord; the adjacent shores are formed into districts, and farmed out to companies of fishermen; some of which are rented for five thousand guilders, or 500 f. per annum.

The chief object of this fishery is the roe or spawn, which is a commodity so much used in Muscovy as butter in Holland; and there are some sturgeons that furnish each four hundred pounds thereof. It is only the lefser and younger sturgeon that they pickle for eating.

Fishery. Turbot. The method of taking turbot and other fish by the people of Scarborough is this: when they go out to fish for turbot, each person is provided with three lines; each man’s lines are fairly coiled upon a flat oblong piece of wicker-work. The hooks being baited and placed very regularly in the centre of the coil, each line is furnished with 14 score of hooks, at the distance of six feet two inches from each other. The hooks are fastened to the lines upon heads of twisted horse-hair, 27 inches in length. When fishing, there are always three men in each cable, and conveniently nine of these lines are fastened together, and used as one line, extending in length nearly three miles, and furnished with 2520 hooks. An anchor and buoy are fixed at the end of each man’s line; in all four anchors, which are commonly perforated stones, and four buoys are made of leather or cork. The lines are always laid across the current, and remain upon the ground about six hours. The cable is 20 feet 6 inches long, and five feet in extreme breadth; it is about one ton burden, rowed with three pair of oars, and admirably constructed for the purpose of encountering a mountainous sea. When the wind suits, they hoist a sail.

Fishery. Whale, or Greenland Fishery. This huge fish, we have elsewhere observed, chiefly caught in the North sea. The largest are found about Spitzbergen, some of them being there two hundred feet in length. Those on the coasts of America are about ninety, or a hundred; and those on the coast of Guyenne, and the Mediterranean, are the smallest of all.

The first persons that seem to have been employed in the whale fishery were the Norwegians, probably soon after their discovery of Greenland, about the year 837; for we find that king Alfred received information from Outher, a Norwegian, in 887 or 890, that the Norwegians were employed in this fishery. He tells the king, that he failed along the Norway coast, as far north as the whale hunters commonly used to travel; but it seems that all knowledge of this painful employ was lost, at least in this country, for almost seven centuries. The Biscaymers were also concerned in it, for the sake not only of the oil, but also of the whale-bone, before the English; for though their north-east discoveries in 1553 had pointed out the way to the whale-fishery at Spitzbergen, they were so ignorant of the business in 1557, as to be under a necessity of procuring information and assistance from Biscay for this purpose. The first mention that occurs in the English history of whale-fins, or whale-bone, is in 1592, when eight hundred fins, part of the cargo of some Biscay ships, that had been wrecked three years before, were brought to England from the bay of St. Laurence in America by an English ship; previous to which time, the ladies’ fans, as Mr. Anderson observes, must have been made of split or some other tough and plaint wood; the whale fishery being carried on for the sake of the oil long before the discovery of the use of the whale-bone, which was first brought to England, with the blubber or oil, in 1617. The English, having been accustomed to the Northern seas, by their repeated trials for a north-west and north-east passage to China, in 1592 commenced their fishery for whales at or near Spitzbergen, where those animals were found in greater numbers than anywhere else. But the first English voyage for the purpose of killing whales was undertaken by the Russian company in 1611, who sent two ships thither, with six Biscaymers, expert in the business; the ships were lost, though their men and boats, &c. were saved by a ship of Hull, then at Spitzbergen. In 1618, the East India adventurers joined flock with the Russian company for pursuing the whale fishery, and fitted out thirteen ships, but the voyage proved unsuccessful. The manner of managing the whale-fishing, both by the English and Dutch, was then quite different from the present mode; the whales, having never been disturbed, returned to the bays near the shore, so that their blubber was easily landed at Spitzbergen, where they erected coarkeries, i.e. cottages, &c. for boiling their oil; and there they kept it distilling from year to year, and only brought home the purifed oil and the whale-bone. The English, having been the first in that fishery, kept possession of the bell bays; the Hollanders, coming later, were obliged to find bays farther to the north; the Danes, who came later into this trade than the Dutch, got in between the English and Dutch; the Englishhers came after the Danes, and after them came the French, and also the Biscaymers, the most ancient whale-fishers in Europe, except the Norwegians, and pursued the same method. But, since these times, the whales are less frequent in the bays, and are commonly among the openings of the ice farther from the land; so that the blubber is now cut from the whales after they are killed, in the manner described in the sequel of this article, and brought home to be boiled and purified, and the whale-fins are also to be cleaned at home.
F I S H E R Y.

home. This latter method of fishing, being dangerous to
flipping, discouraged our English adventurers who traded
in a company: so that they soon after, viz. in 1619,
relinquished the fishery. Some private adventurers pro-
secuted the trade with various success in 1621, 1622, and
1623, when they were molested by the Dutch, who were
then superior in number of ships, and had the prince of
Orange's commission; for in 1622 the Dutch, for preventing
of disturbance in their whale fishery, had erected an ex-
clusive company, who, by their own power, might protect
it; however, the fishery was laid open, in 1643, to all the
inhabitants of the seven provinces. As to the claims which
different European nations have alleged in favour of a
monopoly of the whale fishery at Spitzbergen, it has been
urged by the English that they were the first discoverers,
y'r Hugh Willughby, in 1533; by the Dutch, who
deny his having been so far north as Spitzbergen, and main-
tain their having first discovered it in 1596; by the Danes,
that Spitzbergen is a part of Old Greenland, possess'd in
time by them. But all nations have now wisely
given up their exclusive pretentions, and that part of the
world remains now alike free to all nations for this fishery.
In 1646, king Charles I. confirmed by his proclamation
the Greenland whale fishery solely to the Russia company,
who soon relinquished it. In 1672 an attempt was made
for reviving this fishery, when an act was passed for the
encouragement of it; and this act was continued in 1690,
but without any great effect. A corporation was es-
ablished by act of parliament, in 1693, for carrying on this
fishery, called the Greenland Company.

In 1725, the English South-sea company revived this
trade: but, after great losses, were obliged to discontinue
it, in 1733. At this time a bounty of 20s. per ton was
granted by parliament to British ships of two hundred
tons and upwards, fitted out for the whole fishery, which
bounty was not only continued, in 1740, but an additional
bounty of 10s. per ton was granted during the war with
Spain, in which we were then engaged; and in 1749 a
further bounty, or allowance of 20s., over and above that
of 1733, was granted to all British whale-fishing ships,
and extended to ships of the British American colonies;
and in 1755 this bounty was extended to ships under two
hundred tons burthen: and, as a further encouragement to
this fishery, foreign proprietors, having three years in it,
were naturalized on certain conditions. See Hackluyt's
Coll. Voyages, and Anderson's History of Commerce.

But, notwithstanding the great importance and numerous
advantages of this trade to England, and the encourage-
ment which the legislature has given it, the Dutch carried
it on with much greater success than the English; and it
became one of the principal branches of their flourishing
trade. The chief merchants of the several provinces al-
so associated themselves into a body for carrying it on, and set
every year a great fleet of vessels to the North seas for
that purpose. They attempted to make their first establish-
ments in Greenland; but not succeeding, they have since
fixed their fishery about the western coast of Spitzbergen,
from the latitude of 76 deg. 40 min. to 80 deg. and from
east to west about eighty-nine leagues.

To give some idea of the manner and importance of this
trade, we shall here follow the discipline for a long time
observed in the whale fishery, the method of fishing:
the cargo and equipage of a vessel; and the produce
thereof.
The discipline is adjusted by a landing regulation, consist-
ing of twelve articles; the principal of which are:

That in case a fishing-vehicle be shipwrecked and the cap-
tain and crew saved, the next vessel they meet shall take
them in; and the second vessel take half of them from
the first; but that no vessel shall be obliged to take any
of the loading of a vessel shipwrecked; that as to the effects
of a shipwrecked vessel, which are absolutely relinquished,
and which another captain shall find, and take up, upon
his arrival in Holland, he shall account for one half of
them to the proprietors of the shipwrecked vessel, clear of
all expenses; that if the crew defect a shipwrecked vessel
they shall have no claim to any of the effects saved, but
the whole shall go to the proprietor; but if they be pre-
sent when the effects are saved, and assist therein, they
shall have one-fourth thereof; that if a perfon kill a fish
on the ice, it shall be reputed his own, so long as he
leaves any perfon with it; but the minute he leaves it,
it becomes the due of the first captain that comes that way;
but that, if a fish be tied to an anchor, or a rope fastened
to the flore, it shall remain to its first proprietor, though
he leave it alone; that if any perfon be wounded or hame
in the service, the commissioners of the fishery undertake to
procure him a reasonable satisfaction; to which the whole
fleet shall contribute.

Besides this general regulation, to the observance of
which all the captains, pilots, and masters of vessels, were
obliged to swear, before they put to sea, there was also a
particular one for each ship's crew, which they were all
sworn to execute, in presence of one of the commissioners,
who went aboard every ship, to receive the oath.

This regulation was a kind of charter-party, importing,
that they would attend prayers morning and evening, on pain
of an amercement, at the discretion of the captain; that
they would not get drunk, nor draw their knives, on forfei-
ture of half of their wages; nor fight, on forfeiture of the
whole; that no one should lay wages on the good or ill
success of the fishing, nor buy or sell on those conditions,
in case they took one or more fish, on penalty of twenty-five
florins; that they would be contented with the provisions
allowed them; and that they would never light fire, candle,
or match, by night or day, without the captain's leave, on
the like penalty.

After the reading of this regulation, the crew were all
called to receive the customary gratuity before their set-
ting out, with an allowance of another sum at their return in
proportion to the success of the fishing.

The captain, on this occasion, received from an hundred
to an hundred and fifty florins; the pilot from forty to sixty;
each harpooner from forty to fifty florins; the other officers
from twenty to thirty florins; the elder sailors twenty;
and the younger twelve.

The fleets, which consisted mostly of vessels from two to
three hundred tons, and from thirty-six men to forty-two,
usually set sail about the beginning of April, and took its
course by the isles of Iceland, from 60 to 61 degrees of la-
itude; after which, leaving them to the west, it steered
northward, through 73, 74, and 75 deg. of latitude, where
they began to find the ice.

It was among these huge heaps of ice, wherewith the
whole quarter is filled, that they first began to try the
whales; and there most of the vessels fixed their shore for
the fishing. But as the fish were larger and fatter the farther
north they went, some captains would venture as far as 80
or 82 deg. of north lat. Each vessel of three hundred tons
had fix shallows; and each shallow had fix harpooners,
with fire-steel to row it. To every shallow there were
seven lines, of three inches circumference; five of them
in the hind part of the vessel, and two before. The said
lines together made six hundred fathoms, and, with the

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addition of the other two, eight hundred and eighty. If the whale dived deeper, or ran farther underneath the ice than this float, the line must be cut, left the shallop should be drawn after it.

In the English whale-fishery every ship has fix or seven boats; each of which has one harpooner, one harp-eeer, one manger of the line, and four feather to row it. In each boat there are two or three harpoons, several lances, and six lines fastened together, each line being a hundred and twenty fathom long. To each harpin iron is fastened a strong fick, about six feet long, and a soft pliable line, about six fathom long, called the long-gourd, which is fastened to the lines in the boat. When more line is wanted, the lines of a second boat are fastened to those of the first.

The harpooner, upon sight of the fish, from one end of the shallop where he is placed, flings the harp-iron with all his might against his back; and, if he be so happy as to make it penetrate the skin and fat into the flesh, he lets go a string fastened to the harping-iron, at the end whereof is a dy-gourd, which swimming on the water, discovers whereabouts the whale is; for the minute he is struck he plunges to the bottom, commonly swimming against the wind.

If the whale return to breathe in the air, the harpooner takes occasion to give him a fresh wound, till, fainting by the loss of blood, the men have an opportunity of approaching him, and thrusting a long streaky lance under his gills into his breast, and through the interline, soon dispatch him; and when the carcasse begins to float, they cut holes in the fins and tail; and, tying a rope in these holes, they tow him to the vessel, where he is fastened along the larboard side of the ship, floating upon his back almost level with the sea. They then begin to take the blubber or fat, and the fins, as they are called, or whale-bone.

In order to this, several men stand upon the ship, with a kind of iron carkers, or spars, to prevent their slipping; and cut off the tail, which is hoisted upon deck, and then cut out square pieces of blubber, weighing two or three thousand pounds, which are hoisted on board with the carcan, where each piece is again cut into smaller pieces, each of two or three hundred pounds weight; and these are thrown into the hold, and left to drain for three or four days. When all the blubber is cut from the belly of the fish, it is turned upon one side, by means of a piece of blubber left in the middle, called the cant, or turning-piece; and then they cut out this side in large pieces, called bookies, as before, and also the whale-bones with the gums, which are preferred entire, and hoisted on deck, where the blades are cut and separated, and left till they have time to clean and scrape them. The fish is next turned on its back and the blubber cut out from the back and crown bone; and last of all they cut the blubber from the other side as before. They then cut out the two large jaw-bones, situate in the under-lips, which are hoisted on deck, cleaned and fastened to the throuds, and tubs are placed under them to receive the oil which they discharge; this oil belongs to the captain, and likewise the tail and fins. The carcasse is left to float, and supplies food for Greenland birds, called mallemucks, &c. In three or four days they hoist the pieces of blubber out of the hold, chop them, and put small pieces through the hung-holes into their casks.

A whale, the longest blade of whose mouth is nine or ten feet, generally fills thirty butts with blubber; but one of the largest fish will fill seventy butts and more. A good large whale is valued at about 1000l. flering. A full ship of three hundred tons is worth, clear of all expense, at least 5000l. There is a premium assign'd to every person in the ship for every whale; the captain has three guineas; the mate, one; each harpooner, one; the foreman, one; carpenter, one; cook and boat-eeers, half a guinea each; a common man, a crown; and each boy, half a crown. The captain and harpooneers have no wages; but the captain is allowed twenty-five pounds, and the harpooneers, nine guineas each. In a successful voyage they have fix fillings for every ton of oil boiled in Greenlan-dock; but the rest of the ship's company have monthly wages, besides the fish-money, but no oil-money.

Nothing now remains, but to sail homewards, where the fat is to be boiled, and melted down into train-oil.

The whale-fishery of the Caroline islands is more easy and agreeable than that of all other places, and, befide the great profit, affords a pleasant spectacle to multitudes of people on the shores.

There are ten or twelve of these illes disposed in form of a circle, so that they make a sort of port, in which the sea is perpetually calm and pleasant.

When a whale appears in this gulf, the people all get into their canoes, and rowing toward the sea, keep between the creature and its retreat, and drive him forwards towards the illes at the bottom of the port. They drive him in this manner before them into the shallows, where they plunge into the water themselves, and some get ropes and chains about him, while others dart him with their flairs. Their agility and adrell are wonderful in this. The creature can never get away when they have once got him fastened, but is soon killed, and get to the shore.

**FISHERY.**

_Whale._ To state the produce, we make choice of the fishery of 1697, as being one of the greatest and most fortunate that ever was known; to which we shall add that of the year 1725.

In the year 1697, there were a hundred and eighty-nine vessels of divers nations; whereas a hundred and twenty-one were Dutch, forty-seven Hamburghers, two Swedifh, four Danith, twelve of Bremen, two of Embden, and one of Liebeck; who caught in all 1686 fish.

In the year 1725, there were two hundred and twenty-six vessels; whereas of one hundred and forty-four were Dutch, twelve English, forty-three Hamburghers, twenty-three of Bremen, two of Berghen, two of Flensburg. Their captures were 349 fish.

The Dutch captures in 1697, 41544 puncheons of produced - 
Blubber. 

The Hamburghers - 16414
The Swedifh - 540
The Danith - 1740
The Bremen - 3790
The Embden - 68

The English captures in 1725, produced 1000 puncheons of blubber, and 20 tons of whale-bone.

Now, estimating the puncheon of blubber at thirty florins Dutch, or 26 15s. Englisb, the current price in the year 1697, the total produce of the year's fishing amounts to 175631l. 10s. flering. As to fins, or whale-bones, letting them at two thousand weight per whale, and adding to them at 4l. 4r. they will yield 165312l. which, added to the former sum, amounts to 340943l. 10s.

Mr.
Mr. Anderson, in his History of Commerce, vol. ii. p. 370, observes, from an account of the Dutch whale-fishing for forty-six years, ending anno 1721, that in this time they had employed 5886 ships, and caught 32977 whales, which valued one with another at 500L, give an amount for the whole value of above 16 millions sterling, gained out of the sea mostly by the labour of the people, deducting the expense of the wear and tear of shipping, the earks, and the provisions.

The whale-fishery begins in May, and continues through the months of June and July; but whether the ships have good or bad success, they must come away and get clear of the ice by the end of August; so that in the month of September at farthest they may be expected home; but the more fortunate ships may return in June or July.

The statute 26 Geo. III. c. 41. prescribes the conditions on which ships going on the Greenland whale-fishery shall obtain licences from the commissioners of the customes. A certificate shall be produced, signed by an officer of the customes, after due examination of each ship, stating that the ship is legally qualified for the voyage, by being navigated by a master and three-fourths British subjects, and having on board a competent number of men, boats, lines, provisions, &c. Every ship of the burden of 200 tons, designed for this fishery, shall have on board 40 fishing lines of 120 fathom each, 40 harpoon rods, 4 boats with 7 men at the head, including a harpooner, a keenerman, and a line manager, to each boat, besides the master and larder, and 6 months provision at the head for such a number of men; and every ship of larger burden, an increase of 6 men, one boat, 10 fathom lines, and 10 harpoon rods more, for every 50 tons above the said 200 tons, together with provisions in proportion; and every ship shall have apprentices indentured for 3 years, in the proportion of one at the head for every 35 tons burden, and one fresh or green man for every 50 tons burden. On the return of such ship, her condition shall be certified by the proper officer of the customes, together with a variety of particulars relating to her voyage, cargo, &c. &c.; and the commissioners at the port where such ship shall arrive shall assign a bounty or premium of 30s. per ton, according to the admeasurement of such ship duly certified. This bounty shall be restricted to such ship as shall have sailed from the port whence she cleared on or before the 10th of April in each year, and shall have continued in the Greenland seas, Davis's straits, or seas adjacent, endeavouring to catch whales, and not have departed thence before the 15th of August next following, unless such ship, if 500 tons, be laden with 35 tons of oil, or blubber in proportion, and 1 ton of whale-flins in like proportion to the tonnage, or be forced by accident to depart from these seas. Each ship entitled to the bounty must have kept a log-book. The owners may infringe the bounty, in case of the loss of the ship. Whale-flins, oil or blubber of whales, seal oil or seal skins, or any other produce of seals or fish caught in the seas of Greenland, or Davis's straits, or parts adjacent, may be imported duty free. No harpooner, line-manager, or boat-steerer, belonging to any ship in this trade, shall be liable to be imprisoned from this service. The Greenland seas, Davis's straits, and seas adjacent, shall be deemed and extend to the latitude of 50° 30' N., and no farther. The flat 29 Geo. III. c. 52. c. 53. contains some additional regulations. This act is continued by 41 Geo. III. c. 97.

Southern Whale Fishery. The statutes 32 Geo. III. c. 92. and 42 Geo. III. c. 18, assign premiums to 16 ships employed in this fishery, under certain prescribed restrictions: 12 of which shall be fitted and cleared out between January 1st and December 31st, 1802, and between January 1st and December 31st in each of the three succeeding years, shall sail to the southward of the equator, there carry on the fishery, and return to some port of Great Britain before December 1st in the year subsequent to that of their being cleared out; to 4 of these which shall arrive first within the time limited, with the greatest quantity of oil or head-matter, being not less in the whole than 20 tons in each, shall be allowed 300L each; and 200L. to each of the 4 ships which shall next arrive with the next greatest quantity of oil or head-matter; and 100L. to each of the 4 vessels which shall next arrive with the greatest quantity of oil, &c. not less than 20 tons. To 4 other such ships, which shall proceed to the westward of 30° of latitude, and shall carry on the said fishery, and shall return, before the 31st of December in the second year after their clearing out, to some port of Great Britain, there shall be allowed 400L. each, having not less than 20 tons of oil or head-matter, as aforesaid. The stat. 35 Geo. III. c. 92. requires such ships to be navigated by persons, of whom the master and at least three-fourths of the mariners are his majesty's subjects. Or if such ship clear out from any port of Great Britain, such ship may be navigated by persons being protestants, and who, not being subjects of his majesty, have been before employed in carrying on the said fishery, and on clearing out have taken the oath of fidelity and allegiance to his majesty, and another oath that it is their intention to establish themselves and their families in Great Britain, &c. No premium shall be paid to any ship that has not an apprentices indentured for three years for every 50 tons burden; nor unless such ship shall have regularly kept a log-book on board. The commissioners of the customes in England and Scotland are to pay the premiums, which are to be claimed within two months. Ships concerned in this fishery may sail and pass for that purpose to the eastward of the Cape of Good Hope, and to the westward of Cape Horn, or through the straits of Magellan; but such ships shall be obliged to take out a licence for each respective voyage from the East India company, &c. &c. Every ship intending to navigate any sea comprised within the boundaries of the exclusive trade of the South Sea company, described by an act of the 9th of queen Anne, must take a licence for the voyage from the said company. By statute 42 Geo. III. c. 18. any ship fitting and clearing out, and licensed according to the preceding acts, failing to the eastward of the Cape of Good Hope, and having passed beyond 123° of E. longitude, may pass to the northward as far as 21° of N. latitude, but no further to the northward, until such ship shall have failed or passed to the eastward of 180° E. longitude from London.

Fishery, Writings. These fish frequent the English seas in large schools, particularly during the spring, keeping at the distance of half a mile to three miles from the shore. They are taken in abundance by the line, and afford excellent diversion. They are the most delicate and wholesome of any of the genus, but do not grow to a large size near the coast, where the utmost length is 10 or 12 inches. In the deep water on the edge of the Dogger-bank, they have been found to weigh from four to eight pounds.

Fishery, Free, in Law. The exclusive right of fishing in a public river, is a royal franchise (see Franchise); and is considered as such in all countries where the feudal law has prevailed. (Sedl. More Clavibus, l. 24. Dutrefne, v. 523. Le cig. de Jur. Feud. p. 175.) By appropriating the taking of such grants, and thus the appropriating of that which it seems unnatural to restrain, the use of running water, was prohibited for the future by king John's great charter;
and the rivers that were fenced in his time were directed to be laid open, as well as the forels to be disaffixed. This opening was extended by the fecond and third charters of Henry III. to those also that were fenced under Richard I.; so that a branch of free fishery ought now to be at least as old as the reign of Henry II. This differs from a *federal* fishery; because he that has a federal fishery must also be (or at least derive his right from) the owner of the soil, which in a free fishery is not requisite. (M. 17 Edw. IV. 6, p. 18 Edw. IV. 4. T. 10 Hen. VII. 24. 26. Salk. 63.) It differs also from a common of piscary, in that the free fishery is an exclusive right, while the common of piscary is not so; and, therefore, in a free fishery, a man has a property in the fish before they are caught; in a common of piscary, not till afterwards. (F. N. B. 88. Salk. 67.) Some, indeed, have considered a live fishery not as a royal franchise, but merely as a private grant of a liberty to fish in the federal fishery of the grantor. (2 Sid. 8.)

But to consider such right as originally a flower of the prerogative, till restrained by *magna curta*, and derived by royal grant (previous to the reign of Richard I.) to such as now claim it by prescription, and to distinguish it (as judge Blackstone does) from a federal and a common of fisheries, may remove some difficulties (says the leamed Judge) in respect to this matter, with which our books are embarrassed. For it must be acknowledged, that the rights and dilusions of the three species of fisheries are very much confounded in our law-books: and that there are not wanting respectable authorities (see Hargrave's Notes on Co. Litt. 122.) which maintain, that a federal fishery may exist distinct from the property of the soil, and that a free fishery implies no exclusive right, but is synonymous with common of piscary. Blackft. Com. vol. ii.

**Fisherries, British Society for Encouragement of.** By flat. 35 Geo. III. c. 100. the governor, deputy-governor, and directors of the British society for extending the fisheries, and improving the fca coasts of this kingdom, incorporated by 26 Geo. III. c. 106. are empowered to give the following premiums and loans to persons at the society's Pettett's; viz. Col. a year, in premiums or rewards, to fober and induftrious persons reeding at any of these settlements, who are molt expert in fishing, curing of fish, preparing of foap or oil from fish, making of nets, &c.; and also to lend at legal interet a sum not exceeding 500l. for the purpose of purchasing, building, or equipping boats or other vessels for the fisheries; and also such further sums on loans to such persons as may build houses or tenements at any of the settlements of the society, the sum so lent not exceeding one-third of the value of such buildings, payable by instalments in the course of five years; and also such sums in loans, not exceeding 200l., on proper security to be repaid in one year, to such persons as may undertake to provide flowers of oitmeal or malt, or other necessaries, at either of the said settlements, the sum not to exceed two-thirds of the value of the commodity; and also such sums of money, not exceeding 200l., in loans to such persons as may eitlabish a manufactory of fafl-cloth or corage, &c. such sums to be repaid in three years, and not to exceed two-thirds of the value of the material provided.

**Fishery, aboard a Ship.** Are pieces of timber, convex on one side, and concave on the other, used to strengthen the masts and yards, when they begin to fail, through an extraordinary weight of sail, or after damage in battle, or tempestuous weather. They both nail the fish on with iron spikes, and also avoid them as they call it, that is, wind ropes hard about them. There is also a tackle called the block, in which is the runner of the fish-hook; by which means the fluke of the anchor is haled up to the ship's bow, or chain-ware. (See Blocks.) Perhaps this tackle was called a fish, from that which the ancients called a dolphin, which was a pointed and vastly heavy piece of iron, which they used to heave up by a tackle to a good height, and then, when they came near enough to the enemy's ship, let it fall at once, to break or pierce a hole through the bottom of the enemy's vessel, to sink her.

**Fish-gig.** An instrument used to strike fish at sea, particularly dolphins. It consists of a staff, three or four barbed prongs, and a line fastened to the end, on which the prongs are fixed; to the other end is fitted a piece of lead, which serves to give additional force to the stroke when the weapon flies, and to turn the points upward after the fish is penetrated.

**Fish-garth, according to Skinner, signifies an engine to take fish; but it should rather seem to denote the dam or weir in a river, where these engines are laid and used.**

**Fish gill.** See Ichthyocolla and gill.**

**Fishing, the act or art of catching fish.** Right of fishing and the property of fish belong to the lord of the manor, when he hath the soil on both sides of a river; but where a river ebbs and flows, and is an arm of the sea, they are common to all; and he who claims a privilege to himself must prove it. In the Severn, the soil belongs to the owners of the land on each side; and the soil of the River Thames is in the king, &c. but the fishing is common to all. There are several statutes for preventing the defraction of the fry of fish; and persons using nets for that purpose, or taking salmon or trout out of season, or any fish under certain lengths, are liable to forfeit money, and justices of peace and lords of leets have power to put the acts in force. See 1 Eliz. cap. 17. 3 Jac. I. cap. 12. 30 Geo. II. cap. 21. See Salmon Fishery, and Stealing of Fish.

Fishing is distinguished with regard to its instrument into that performed with the net, for fish that go in shoals; and that with the hook, for solitary fish; which latter is properly called angling.

Fishing, again, is distinguished with regard to its object into that performed in salt water, and that in fresh. The fish practised for whales, herring, cod, salmon, pike, and all other fresh-fish. The latter practised for pike, trout, eels, perch, dace, chubb, &c.

The instruments principally used in angling or fishing with the hook, are the rod, line, hook, and fly.

The points on which the art of fishing chiefly turns are the proper season, place, bait, and manner of application. What relates to each thereof, we shall here give the reader in the several kinds of fishing chiefly practised among us.

In March, April, and September, the warmest days are the best for fishing, and the bait must be deep; for the fish in these cool months lie near the bottom. In fly-fishing, it is always observed, that the fish will rise after a small flower of rain, that has just beat down the flies upon the water without muddying it. March, April, May, and June, are the best months for fly fishing, and the best hours are about nine in the morning, and three or four in the afternoon; in a still warm evening they will eat as long as the day light lasts, at these seasons when the gales are few and plentifully about in the air.

In the extremity of heat, when the earth is parched with drought, there is but little sport to be expected in fishing in any water. In cold weather, when there is a white hoary frost in the morning, the fish will not bite kindly all
all day, except in the evening, if that should prove serene and warm.

Too much wind is never convenient for fishing, though a little is rather advantageous than otherwise. It is bad fishing about sheep-shearing time, in waters where the sheep are washed; for the fish glut themselves in such a manner with what is washed from these creatures, that they will not take any bait till that feaon is over.

North and east winds are enemies to fishing; and it is not right to fish soon after the time of the fish spawning, for they are then sick, and have no great appetite, so that they do not bite readily. All fish have a natural fore-knowledge of a shower of rain, and when clouds are coming on that will fall in rain, they will not bite; the expert angler, who is used to this, often escapes being wet to the skin by it.

The subterranean or under-ground fishing of the lake Ribebklajmim has been much talked of by those who have written of the Zirchütter See, of which it is a part; but on the whole it amounts to no more than this. The waters of this lake emptying themselves through subterranean passages into another lake below, the whole body of the water, with the fish in it, is first received into a large opening, which conveys it into a fort of subterranean bason, in the bottom of which there are many holes, and through these the water is let out, but the fish left behind. The people of the place who know this, defend through the large hole into this subterranean bason with torches in their hands, and as the waters run off, they seize upon the fish wherever they can catch them. This sort of fishing is attended with one inconvenience; for the people being obliged to stand up to the middle or less in the water, the horse-leeches, which are extremely plentiful there, seize upon their legs and other parts, and are only to be got off by some perfons making water upon the part; the heat and nauseous stale of the urine always making them let go their hold.

Phil. Trans. N° 91.

For a curious method of fishing in China, see CHINA.

Fishing, White-lake. See Bait.

The season for taking white-bait is only from the first of August to the first of October. 30 Geo. II. cap. 21.

Fishing, Barbel. See Barbus.

No barbel is to be taken in the Thames or Medway under twelve inches in fize, from the eye to the end of the tail, and only between the twenty-fourth of August and the twenty-first of March. 30 Geo. II. cap. 21.

Fishing, Carp. The carp is generally held the queen of fresh-water fish. It is exceeding lubile, and of all others, the eel only excepted, lives longest out of water. Mr. Ray affirms us, that in Holland they have a speedy way of fattening them, by hanging them up in a net in a cellar, and feeding them with white bread and milk. The fish is wrapped up in a quantity of wet moss, spread on a piece of net, and then gathered into a puerse in such a manner, however, as to allow him room to breathe. The net is then plunged into water, and hung up to the ceiling of a cellar: the dipping must at first be repeated every three or four hours, but afterwards it need only be plunged into water once in about fix or seven hours. Bread soaked in milk is first given him in small quantities: in a short time the fish will bear more, and grow fat by this treatment. Many have been kept in this way, breathing nothing but air, for several days successively. (Phil. Trans. vol. ixi. part 1. p. 510.)

They breed several times in the year; for which reason we seldom meet with male or female without either milt or spawn. Their natural place is some full water; in running waters they rarely, if ever, breed. To make them fat and large, it is a good way, when the pond is low, in April, to take all the sides thereof with an iron rake, and low hay feeds thereon. By autumn there will be a crop of grases, which coming to be overflowed as the pond rises, will be a fine feeding-place for them. See Fish-Ponds.

Great patience is requisite in angling for carp, on account of their incredible policy. They always choose to lie in the deepest places; they seldom bite in cold weather; and in hot, a man cannot be too early or too late for them. When they do bite, there is no fear of the hold. The tackle must be very strong, and it will be proper to bait the place beforehand, where it is to he tied for, with a coarse paffe. It may be also proper to bring the carp to the place intended for angling, by throwing in cow-dung and blood, or bran and blood mixed together, or some chicken guts cut small. The baits are the red-worm, in March; the ead, in June; and the grases-hopper, in July, August, and September. Proper pases may also be prepared for them; as honey and sugar, wrought together with flour, and thrown in pieces into the water some hours before you begin to angle. Honey and white crumbs of bread mixed together also make a good passe. The following passe is much recommended; take common wheat flour and veal, or any other young meat, of each equal quantities; beat them together in a mortar till the meal is thoroughly dissolved or broke to pieces; then add half the quantity of honey; beat it well together again, and add more flour till the whole is of a proper consistence. This has the advantage of a pafe, and of an animal bait, and hangs well upon the hook, so that it seldom falls of success.

The bell season for catching such as are intended for sale is autumn.

Fishing, Club. The chevin or club is a fresh-water fish with a large head. It spawns in March, and is very strong, though inactive, yielding in a very little time after it is flurk; and the larger it is the quieter. His bait is any kind of worm or fly, particularly the large yellow moth; also grains, cheeves, the pith in the bone of an ox’s back, &c. He affects a large bait, and variety of them at the same hook. Early in the morning angle for him with nailles; but, in the heat of the day, choose some other bait; and in the afternoon, fish for him at ground or fly. See Club.

No club is to be taken under nine inches from the eye to the end of the tail, and only between August 24th and March 21th, in the river Thames and waters of Medway. 30 Geo. II. cap. 21.

Fishing, Dace or Darr. See Dace.

No dace are to be taken in the Thames or Medway under six inches from the eye to the end of the tail in size, and only between August 24th and March 21th. 30 Geo. II. cap. 21.

Fishing, Eel. See Eel.

The silver-eel may be caught with divers baits, particularly powdered beef, garden-worms or lob, narrow, hens guts, fish, garbage, &c. But as they hide themselves in winter in the mud, without fluring out for six months, and in the summer, they take no delight to be abroad in the day, the most proper time to take them is in the night, by fastening a line to the bank side with a hook in the water: or one line may be thrown at large, with a good time of hooks baited, and plumped with a float, to discover where the line lies in the morning. A small hook does well here for a bait, the hook being laid in his mouth. For other methods of catching eels, see boreing, BULINT, ESL, fE, and Snigiling.

No lumps or rods for eels are to be laid in the Thames and Medway.
FISHING.

Medway but from April 21st to October 20th; but they may be hooked for all the year. 30 Geo. II. cap. 21.

FISHING, Flounder. The flounder is a flat sea or river fish, caught in April, May, June, and July, in any time of the day, in a swift stream, and sometimes also in a still deep. The bell bait is red worms, wafts, and gentles.

Flounders may be taken in the rivers Thames and Medway at any time of the year; but their size must not be less than six inches from the eye to the end of the tail. 30 Geo. II. cap. 21.

FISHING, Gudgeon. The gudgeon is a small fish of a very delicious taste. It spawns three or four times in the summer-fish, and feeds in streams and on gravel, flying all kinds of flies; but insensibly taken with a small red worm, fishing near the ground; and being a leather-mouthed fish, will not easily get off the hook when struck. The gudgeon may either be taken with a float, the hook being on the ground, or by hand, with a running line on the ground, without cork or float. He will bite well at wafts, gentles, and cadworms; and one may even fish for him with two or three hooks at the same time, which makes good sport.

When you angle for gudgeons, fix up the float or gravel with a long pole, which will make them gather to the place and bite the faster.

The season for gudgeon fishing in the Thames and Medway is from August 24th to March 21st. 30 Geo. II. cap. 21.

FISHING, Perch or Poll. The perch or perch is hook-backed, not unlike a boby, armed with sharp prickers, and his lid's with dry thick scales; he is voracious, and will venture on his own kind even with greater courage than the pike. He seldom grows much above a foot long. He spawns in February or March, and bites best when the spring is far spent. The proper baits are the bradling, minnow, and small frog: as also the lob worm, bob, oak worm, gentle, waft, and cad-bait. The minnow yields the bell sport, which is to be alive, and fluck on the hook through the upper lip or back-fin, and kept swimming about the water. If the frog be used, he is to be fastened to the hook by the skin of his leg. When the fish bites, as he is prone of the leather-mouthed kind, he must have time to pound his bait. The bell place to fish for him is in the turning of the water eddy in a good gravel bottom.

No perch is to be taken in the Thames or Medway under six inches from the eye to the end of the tail, and only between August 24th and March 21st. 30 Geo. II. cap. 21.

FISHING, Pike. The pike is reputed the tyrant of the fresh waters. By the common content of naturals, he is the longest-lived of all fishes. The longer he is found, the courser is his flesh; and so aye merly. This fish never swims in shallows, but always single, being very rapacious, and praying even on his own kind. The pike spawns in February and March. The bell fort is in rivers; the worst in mere and ponds. His ordinary food is frogs, and what fish he can lay hold on.

There are two ways of fishing for the pike: by the ledger bait and the sliding-bait. 1. The ledger-bait is that fixed in one certain place, and which the angler may leave behind him. Of this kind the bell is some living bait, as a dace, roach, gudgeon, or a living frog. To apply it, if a fish, flick the hook through his upper lip; then fastening it to a strong line twelve or fourteen yards long, tie the other end of the line to some stake in the ground, or bough of a tree, near the pike's usual haunt, letting the line pass over the fork of a stick placed for the purpose, suspending the hook, and about a yard of line in the water, but so as that when the pike bites, the fork may give way, and let him have line enough to go to his hold and paunch. If the bell be a frog, the arming wire is to be put in at his mouth and out at his vent, and one of his legs to be hitched or tied over the upper joint of the wire. 2. The walking-bait is that which the fisher calls in, and conducts with a rod, &c. This is perforated by a troll, with a winch for winding it up. At the top of the line is to be placed a ring for the line to be run through. The line, for two yards and a quarter next the hook, to be of flax double, and armed with wire the length of seven inches. On the flank of the hook is to be fastened a smooth piece of lead, so as to sink the fish-bait, which is to be a gudgeon with its head downwards. Thus disposed, the bait is to be cast up and down; and if you feel the fish at the hook, give him length enough to run away with the bait, and paunch it; then strike him with a smart jerk. To fish with a dead bait, use a yellow frog, dace, or roach, anointed in gum of ivy, dissolved in oil of spike, and call it where thepike frequents. After it has lain a little while at the bottom, draw it to the top, and so up the stream, and you will quickly perceive a pike in earnest pursuit thereof. This fish bites best about three in the afternoon in clear water, with a gentle gale, from the middle of summer to the end of autumn; but in winter all day long, and in the spring he bites better early in the morning, and late at night. Another method of fishing for pike, see under Hoxing.

No pike or jack is to be taken in the Thames or Medway under twelve inches from the eye to the end of the tail, and only between August 24th and March 21st. 30 Geo. II. cap. 21.

FISHING, Roach. The roach or roachet is no delicate fish. Those in rivers are more valued than those in ponds, though the latter are much the larger. They spawns about the middle of May.

To angle for this fish in April, cads or worms are proper baits; flats are small white snails or shies in summer. The bait is always to be under water, for this fish will not bite at top. Others use May-fly in that season with good succs. In summer, a pell or mulch be used, made of the crumb of white bread moulded with a little water, laboured with the hands into a tough paste, and coloured not very deep, with red lead. In winter, gentles and the bell bait. Sprouted malt, the young braid of wafts, and bees dipt is blood, and the thick blood of sheep half dried, are notums in this fort of fishing.

In the neighbourhood of London they have a peculiar method of fishing for roach; they take a strong cord, at the end of which is fastened a three pound weight; and a foot above the lead a packthread of twelve feet is made fast to the cord; and to the packthread, at proper distances, they add twelve strong links of hair with roach hooks at them, baited with a white snail or periwillie. Tie on holding the cord in their hands, the biting of the fish draws the packthread, and this the cord, which gives them notice what to do. By this means they sometimes draw up half a dozen, and very commonly two or three at a draught. By 30 Geo. II. cap. 21, no roach is to be taken in the Thames or Medway under six inches from the eye to the end of the tail, and only between August 24th and March 21st.

FISHING, Smelt. See Smelt.

By 30 Geo. II. cap. 21, no smelt is to be taken in the Thames or Medway less than five inches from the eye to the end of the tail, or at any time, except from January 25th.
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25th to June 16; and those that are caught in other waters
must be of the above size. 33 Geo. II.

FISHING, Seal. See Seal.

FISHING, Tackle. The tackle is a fine fresh water fish,
having very small scales, but large, smooth fins, with a red
circle about the eyes; and a little lump hanging at each
corner of the mouth. It takes more delight among weeds
in ponds than in clear rivers, and covets to feed in foul water.
His time is said to have a healing quality for wounded
fish; upon which he is commonly called the fisher
physician. When the carp, pike, &c. are hurt, it is
said they find relief by rubbing themselves against the
net.

The season for catching this fish is in June, July, and
August very early and late, or even all night, in the shall
part of rivers. This bait is a large red worm, at which he
bites very eagerly, especially if first dipped in tar. He
also delights in all sorts of同志 made up of strong-
scented oils, or with tar; or a paste of brown bread and
honey; nor does he refuse the eel-worm, lob-worm,
flag-worm, green gentles, cod-bait, or soft boiled bread-
grain.

When a number of tench are to be taken out of a muddy
pond, the method is to take a large casing net, well leaded,
and with the meshes from the crown to a full yard and a
half, not too small; for then, if the pond be deep, the fish
will strike away before the net gets to the bottom. The
place where the net is to be thrown into must be cleared of
weeds, &c. with a rake. A bait is next to be prepared
for drawing the fish together; for this purpose put a quar-
ter of a peck of wheat into three quarts of water, lend
it to an oven, and let it be well soaked; then add to it five
points of blood, and as much bran as is necessary to give it
the consistence of a paste; mix with it some clay, and add
a quart of lob-worms chopped to pieces. Let the whole
be wrought up into a stiff paste, and rolled into balls of the
size of a hen's egg, and throw these into the pond in the
place where the net is to be cast. Let these, and some grains,
be occasionally thrown in, and the place be thus baited for
several days. When the fish may be supposed to be well
acquainted with the place, let a good baiting be given in the
morning, and in the close of the evening let the casing-net
be carefully thrown in. When the net is sunk, the mud all
about it is to be stirred with a long pole with a fork at the end;
the net to be half an hour, and the mud to be thus
stirred all the time; by this means the tench will be raised,
and will be taken in pulling out the net; but if the net were
to be thrown in and taken out in the common way, there
would hardly be one fish taken; for the suffocation of both
tench and carp, when they are frightened, is to plunge their
heads up to the eyes in the mud, and thus placed with their
tails erect, the net must draw over them, without the possi-
bility of entangling them.

FISHING, Trout. The trout is a delicious fresh water fish,
speckled with red and yellow, coming in and going out of
seasom with the back, and spawning in the cold months of
October and November, whereas all the other species spawn
in hot summer weather. There are divers kinds of this fish,
all valuable; but the best are the red and yellow trout; and
of these the female, distinguished by a lfs head and deeper
body, is preferred. They are known to be in season by the
bright colour of their spots, and by their large and thick
back; which last may serve also as a rule for other fish.
Through the whole winter they are sick, lean, and unwhole-
some, and frequently lousy. As the spring comes on, de-
serting the shall, deep waters, they repair to the gravelly
ground, against which which they continue to rub till they get rid
of their lie, which are a kind of worms with large heads.
From that time they delight to be in the sharp streams, and
such as are swift, where they lie in wait for minnows and
May-flies. At the latter end of May they are in their prime.
The usual baits whereby the trout is caught are the worms,
minnow, and fly, either natural or artificial. The proper
worms are the branding, lob-worm, squirrel-tail worm,
which has a streak round the back, a red head, and a broad
tail, earth worm, dung-worm, and maggot or gentle, espe-
cially the three fish; the branding is commonly found in
an old dunghill, or under cow-dung, or else among tanner's
bark; the others are found in the earth, and under large
stones, or stumps of trees; but whatever worms are used,
they are the better for keeping, which is to be done in an
carthen pot, with moss, frequently changed. To take the
trout with a ground bait, the angler should have a light
tapered rod, with a tender hazel top; and may angle with a
single hair of three links, the one tied to the other, for
the bottom of the line, and a line of three-hair links for the
upper part: with this sort of tackle, if the sportsman has
room enough, he will take the largest trout in any river. The
angler must always keep out of sight, and the point of the rod
must be down the stream. The season for fishing for the
trout for the ground bait begins in March, and the morn-
ings and evenings are the best time of the day; but in cloudy
weather the sport may be followed all day long. There
must be a plummet at ten inches from the hook, which the
angler must feel always touching the ground; and this must
be heavier as the stream is fowter. When the minnow is
used, change the whiteh, and that of middling size; slip
the hook through his mouth, and the point and head out at
the tail, so as it may be almost slung on the hook. Then
try, against the stream, whether it will turn. The tackle
in this case may be stronger, for the trout will setze this bait
as soon as it comes in flight; the upper part of the line may
be of three silk and three hairs, and the lower of two of
each; and the hook may be moderately large. In place
of a minnow, a small loach, or stickle-back, may serve the
turn; or, for want of either, an artificial one may be made
of cloth by the life, which is found every whit as good a
bait as the natural one.

The most agreeable manner of fishing for trout is with
the fly: the rod in this case must be light and pliable, and
the line long and fine; if one hair be strong enough, as it
may be made by proper skill in the angler, there will be
more fish caught than when a thicker line is used; and the
fly-fisher should have the wind in his back, and the sun
before him. See Angling.

By Eliz. cap. 21, no trout is to be taken under eight
inches in length; and by Stat. 44 Anne, cap. 21, sea-trout
is not to be taken in particular rivers, creeks, or arms of
the sea between June 30th and Nov. 11th. By 30 Geo. II.
cap. 21, no trout is to be taken in the Thames or Medway
between November 11th and August 24th, or to be of less
weight than one pound.

FISHING-flies. See the preceding articles, and Angling.

FISHING-flies, a bait used in angling for divers kinds of
fish. The fly is either natural or artificial.

Natural flies are innumerable: the most usual on this
occasion are the dunfly, the stone or May-fly, the red-fly,
the moon-fly, the tawny-fly, the vine-fly, the black-fly, the
d作者本人, the flag-fly: also caterpillars, canker-flies, bear-flies, &c. all which appear sooner or later,
according to the forwardness or backwardness of the
spring. To know the particular fly the fish most covets,
when you come in the morning to the river's side, beat the
bushes with your rod, and take up what variety you can of
all
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all sorts of flies; try them all, and you will quickly find which are in most esteem; but that fish will sometimes change their fly; but it is only when they have sometimes flitted themselves therewith.

There are two ways to fish with natural flies, either on the surface of the water, or a little underneath it.

In angling for chub, roach, or dace, move not your natural fly twilly, when you fee the fish make at it; but rather let it glide freely towards him with the stream; but if it be in a still and slow water, draw the fly slowly sideways by him which will make him eagerly pursu it.

The artificial fly is most successfully used in blustering weather, when the waters are too troubled by the winds that the natural fly cannot be seen, nor rest upon them.

Of this artificial fly there are reckoned ten principal sorts:

1. The dun-fly, in March, made of dun wool, and the feathers of a partridge wing. 2. A dun-fly, made of black wool, and the feathers of a black drake; the body made of the drift, and the wings of the latter. 4. The snow-fly, in April, the body made of black wool, dyed yellow under the wings and tail. 4. The ruddy-fly, in the beginning of May; the body made of red wool, and bound about with black silk, with the feathers of a black capon, which hang dangling on his sides next his tail. 5. The yellow or greehol fly, in June; the body made of black wool, with a yellow fih on either side, and the wings taken off the wings of a buzzard, bound with black broken hemp. 6. The moon-flv; the body made of dunfih wool, and the wings with the blackish mail of a drake. 7. Tawny-fly, till the middle of June; the body made of tawny wool, the wings made contrary one against the other, of the whitish mail of a white drake. 8. The waf-fly, in July; the body made of black wool, call about with yellow silk, and the wings of drakes' feathers. 9. The telc-fly, in the middle of July; the body made of greehol wool, call about with the feathers of a peacock's tail, and the wings made of buzzards' wings. 10. The drake-fly, in August; the body made of black wool, call about with black silk, his wings of the mail of a black drake, with a black head.

The best rules for artificial fly-fishing are,

1. To fish in a river somewhat disturbed with rain, or in a cloudy day, when the waters are moved by a gentle breeze; the south wind is best; and if the wind blow high, yet not so but that you may conveniently guide your tackle, the fish will rise in plain deeps; but if the wind be small, the bell anging is in swift streams.

2. Keep as far from the water-fish as may be; fish down the stream, with the sun on your face, and touch not the water with your line.

3. Angle always in clear rivers with a small fly and slender wings, but in muddy places use larger.

4. When after rain the water becomes brownish, use an orange fly; in a clear day, a light-coloured fly; a dark fly for dark waters, &c.

5. Let the line be twice as long as the rod, unless the river be encumbered with trees.

6. For every sort of fly have several of the same, differing in colour to suit with the different complexions of several waters and weathers.

7. Have a nimble eye and active hand, to strike presently with the rising of the fish, or else he will be apt to throw out the hook.

8. Let the fly fall first into the water, and not the line, which will scare the fish.

9. In slow rivers or still places, call the fly cross over the river, and let it fish a little in the water, and draw in gently back with the current.

Salmon flies should be made with their wings standing out beside the other, whether two or four. That fish delight in the gaudiest colours that can be; chiefly in the wings, which must be long, as well as the tail.

Fishing-flasts are little appendages to the line, serving to keep the hook and bait suspended at the proper depth, to discover when the fish has hold of them, &c.

Of these there are divers kinds, some made of Muscovy duck quills, which are the best for slow waters; but for strong streams, found cork, without flaws or holes, bored through with an hot iron, into which is put a quill of a fit proportion, is preferable; pare the cork to a pyramidal form, and grind it smooth.

Fishing-bobs, a little engine of steel-wire, of a proper form to catch and retain fish.

The fishing-hook, in general, ought to be long in the shank, somewhat thick in the circumference, the point even and straight: 1. the bending be in the shank. For setting the hook on, use strong, but small silk, laying the hair on the inside of your hook; for if it be on the outside, the silk will fret and cut it asunder.

There are several sizes of these fishing-hooks, some big, some little; and of these some have peculiar names, as,

1. Single-hooks. 2. Double-hooks, which have two bendings, one contrary to the other. 3. Snappers or gorgers, which are hooks to whip the artificial fly upon, or to bait with the natural fly. 4. Springers or spring-hooks, a kind of double hooks, with a spring which flies open, being struck into any fish, and so keeps its mouth open.

Fishing-line. See Angling Line.

Fishing-nets. See Net.

Fishing-rods, a long, slender rod or wand, to which the line is fallened for angling.

Of these there are several sorts, as,

1. A troller or trolling-rod, which has a ring at the end of the rod for the line to go through when it runs off a reel. 2. A whisper or whipping-rod, a top-rod that is weak in the middle, and top-heavy, but all slender and fine. 3. A dopper, which is a strong rod, and very light. 4. A snapper, or snaper-rod, that is, a strong pole, peculiarly used for the pike. 5. A bottom-rod, being the same as the dopper, but somewhat more pliable. 6. A niggling or poking-flick, a forked stick, having a short iron line, with a needle, baited with a lob-worm; this is only for eels in their holes.

Fishing-rods are made of different materials and strength, according to the purposes for which they are used: in fishing with m. x than one hair, and with a silk-worm gut, red seal is reckoned the best, with hickory top, and the length of the whole rod should be about four yards; but for a small fly and single hair, the length of three yards will be sufficient, with the top of yellow hickery, and about nine inches of whalebone, near as long as the rod, which should be of white deal. The rods or buts of rods are generally of ground hazel, ash, or willow, about two or three feet long; and every joint should gradually taper to the top. Hazel tops are preferred, though some use the Bamboo cane, and say it exceeds the best hazel.

For ground angling, especially in muddy waters, the cane or reed is preferred for a flocck; with a hazel top, consisting of one, two, or three pieces, and a small piece of round, smooth, taper whalebone, which is whipped to the hazel with strong silk, rubbed with shoemakers wax; the whole length of the rod being five yards or five and a half yards. The best method of piercing hazel and bone is first to whip the end of the hazel with thread, and to bore it with a square
a square piece of iron of a proper size; and then make the thick end of the bone, first dipped in pitch to go into it; after which let it be scraped, filed, and neatly whipped. However, the neatest rod may be thus made: get a thick white deal or fir-board, free from knots, and seven or eight feet long; let this be divided by a joiner into several breadths, and with his planes let him smooth them round, smooth, and taper. To one of these fasten an haze rod, fix or seven feet long, which may consist of two or three pieces; to the top of which fix a piece of yew, about two feet long, made round, taper, and smooth, and to the yew a piece of small, round, smooth whalebone, five or six inches long. The fir may be coloured by warming it at the fire, and with a feather dipped in aqua-fortis, stroking it over and chasing it into the wood, which will make it of a pure cinnamon colour.

It is found useful to have rings or eyes made of fine wire, and placed upon the rod from one end to the other, in such a manner that when the eye is laid to one you may see through all the reel: through these rings the line is made to run, which will thus be kept in a due posture; and you must have a wire or wheel affixed to the rod about a foot above the end, by which, whenever it is proper, you may give range to the fish. See Angling.

Fishing-tack, or those used in the several fisheries at sea, or on the coasts, are the buoys, coles, cock, dogger, driver, cod-boat, fly-boat, fluyt, hooker, Peter-boat, smack, fland boat, trawler, trinker, &c.

Fishing Bay, in Geography, a bay of America, in Maryland, lying on the east side of Chelapeake bay, partly in Dorchester and Somerset counties, the entrance of which is between Goldsborough and Devil’s islands. This bay receives several rivers from each of the above-mentioned counties as the chief of which are Wicomico and Nanaimoke, and also Tranquaquing and Blackwater creeks.—Also, a bay on the south side of lake Ontario, about 37 miles E. of Fort Niagara.

Fishing Creek, a township of America, in Pennsylvania, situated on Susquehanna river.—Also, a river of Virginia, which runs into the Ohio. N. lat. 39° 55'. W. long. 80° 57'.—Also, a river of Kentucky, which runs into Cumberland river, N. lat. 36° 40'. W. long. 84° 19'.—Also, a river of Pennsylvania, which runs into the Susquehanna. N. lat. 40° 19'. W. long. 76° 56'.—Also, a river of New Jersey, which runs into Delaware bay. N. lat. 39° 5'. W. long. 74° 54'.

Fishing-town Point, a cape on the east coast of Borneo, S. lat. 1° 38'. E. long. 116° 30'.

Fiskilil, a port town of America, in Dorchester county, New York, five miles E. of Hudson river or Fishkill, containing about 30 houties, a church for episcopans, and another for Low Dutch. The town is very extensive, and contains six churches, and 6168 inhabitants, of whom 524 are slaves; 66 miles N. of the city of New York.

Fiskill landing is a part of the above town on the river, where is a post-office.

Fiskill, or Creek, is the small river on which the above-mentioned town stands, and from which it derives its name. It discharges itself into Hudson river, nearly opposite to New Windsor.—Also, the name of a small stream which runs S.W. into Oneida lake.—Also, a stream which rises from Saratoga lake, and runs six miles easterly to the Hudson. Its mouth is opposite to Batten-kill, two miles above Saratoga town, memorable on account of general Burgoyne’s army having laid down their arms as prisoners on its north side, during the conflict between Great Britain and America.

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Fislelin, one of the smaller Shetland isles, five miles S. from the island of Yell. N. lat. 60° 13'. W. long. 1° 23'.

Fisll Pond, reservoirs of water for the breeding, feeding, and preserving of fish.

The quality of the pond, water, &c. proper for this end is scarce determinable by any certain symptom or rule: for some very promising ponds do not prove serviceable that way. One of the best indications of a breeding pond is, when there is a good store of rubbish and grazing about it, with gravelly fiddoal, such as horse-ponds usually have; and when a water takes thus to breeding, with a few milers and spawners, that is, males and females, two or three of each, a whole country may be stocked in a short time.

Eels and perch are of very good use to keep down the flock of fish; for they prey much upon the spawn and fry of bred fish, and will probably destroy the superfluity of them.

As for pike, perch, tench, roach, &c. they are desired in breeding almost in any waters, and very numerously; only eels never breed in standing waters that are without springs; and in such are neither found, nor increase, but by putting in; yet where springs are they are never wanting, though not put in. And, which is most strange of all, many say there is not in an eel the least token of propagation, either by milk or spawn; so that law they are produced is a question very mysterious. See Eel.

For fish-ponds, it is agreed, those grounds are best which are full of springs and are to be moist; the one breeds them well, and the other preserves them from being taken. The situation of the pond is also to be considered, and the nature of the currents that fall into it; likewise, that it be refreshe with a little brook, or with the rain-water that falls from the adjacent hilly ground. Add, that these ponds which receive the fall and run of horses, and other cattle, breed the largest and fattest fish.

Fish-ponds are not only a thing of convenience to great families, but may be made a very profitable article with the farmer under due management. Watery and boggy land is often fit for no other use, and these are then a great improvement of it. Ponds made in dry grounds in the flat bottoms between hills, will also serve not only to supply the cattle with water, but the profit of the fish that may be bred in them is greater than many are aware of, and comes without any labour or expense.

In making the pond, observe that the head be at the lowest part of the ground; and that the trench of the flood-gate or sluice have a good swift fall, that it may not be long in emptying on occasion.

The best way of making the head is by driving three or four rows of stakes about six feet long, and at about four feet distance from one another, the whole length of the pond head: the first row of these is to be driven in four feet deep, that they may be very firm and secure; and if the bottom be not good, but be of a loam bottom, some line is to be added, which will harden into a great lot of roots. The earth dug out of the pond is to be laid between these stakes and rammed hard down. Other rows of stakes must be added behind and over these, and the pipe is filled up till the whole is as high and as thick as it is required. The face of it must be made even and firm, and there must be a wash kit to carry on the upper part of water in floods, &c.

If the pond carry six feet of water, it is enough; but it must be made eight feet deep, to receive the trusses and runs that may fall into it.

It would also be advantageous to have fence on the sides for the fish to run themselves in, and are their spawn in;
beside, in other places, certain holes, hollow banks, shelves, roots of trees, islands, &c. to serve as their retiring-places. Consider farther, whether your pond be a breeder; if so, never expect any large carp from thence, the greatness of the number of spawn overstocking the pond.

Carp and tench will live and thrive very well together in the same pond. Where pike are kept, there should be roach, or some other quick breeding fish, to supply them with food.

Some think that pike and tench may be kept in the same pond. They imagine that pike will not feed upon tench; but they are mistaken, for the pike is fonder of this than of almost any other fish. Ponds with clear gravelly and sandy bottoms are usually the best for breeding of fish, and foul water with muddy bottoms is the best for them to fatten in. Carp have been known to grow in one year from five to eighteen inches long in ponds where the water of the common fewers of any town have run into it.

The ordinary growth of a carp is not above two or three inches in that time, so that all the excess is to be attributed to the fatsness of the water of the fewers.

The carp, which was first brought into England by Leonard Mafeal, about the year 1514, is the most valuable of all kinds of fish for the stocking of ponds, because of its quick growth and great increase. If the breeding and feeding of this fish were more understood and practiced, the advantages would be very great, and fish-ponds become as valuable an article as gardens. The gentleman who has land in his own hands may, beside furnishing his own table, and supplying his friends, raise a great deal of money, and very considerably improve his land at the same time, so as to make it yield more this way than by any other employment whatever. The sale of carp makes a part of the revenue of the nobility and gentry in Prussia, Pomerania, Brandenburg, Saxony, Bohemia, Mecklenburg, and Holstein.

For this purpose particular attention should be paid to the soil, water, and situation of the carp-ponds: the best kinds of ponds are those which are surrounded by the finest plantations and corn-field of a rich black mould, having soft springs on the spot, or running water that is neither too cold, nor impregnated with acid, calcareous, felsitic, or other mineral particles. The water, indeed, may be softened by exposing it to the air and sun in a reservoir, or by forming an open channel for it at some distance from the pond. They should likewise be sheltered against the contrary and northerly winds, and be fully exposed to the influence of the sun.

It is found by experience most convenient to have three kinds of ponds for carp; viz. the spawning pond, the nurting and the main pond. The first sort of pond must be well cleared of all other kinds of fish, especially those of the rapacious kind, such as the pike, perch, eel, and trout, and also of all weeds, of lizards, and the water-beetles. It should be supplied with soft water, and be exposed to the sun and air. A pond of one acre requires three or four male carp, and five or eight female ones, and in the same proportion for each additional acre. The heat of breeding are those of five, six, or seven years old, in good health, with full scales, fine full eyes, and a long body, and without any blemish or wound. The pond should be stocked on a fine calm day, towards the latter end of March or in April. Carp spawn in May, June, or July, according to the warmth of the weather: and for this purpose they swim to a fresh, warm, sheltered place, where they gently rub their bodies against the muddy ground, gravel, or other, and by this pressure the spawn issues out. At the spawning season all kinds of fish should be kept from the ponds. The young fry, hatched from the spawn by the general influence of the sun, are left in this pond through the summer, and even the next winter, if the pond is deep enough to prevent their suffocation under the ice in a severe winter; otherwise the breeders and fry are put into separate ponds, more convenient for the wintering.

Ponds of the second kind are the nurseries; the young should be removed into the nurseries in March or April, on a fine calm day; a pond of an acre will admit a thousand or twelve hundred of this fry. When they are first put in, they should be well watched and driven from the sides of the pond, lest they become the prey of rapacious birds. In two summers they will grow so much as to weigh four, five, sometimes six pounds, and to be fishy and well tailed.

The main ponds are the last sort; into these are put carp, that measurfe a foot, head and tail inclusive. Every square of fifteen feet is sufficient for one carp; their growth depends upon the room, and the quantity of food allowed them. The best f wcs for ridding the main ponds are spring and autumn: carp continues to grow for a long time, and to a very considerable size and weight. Mr. Forster mentions one which he had seen in Prussia above a yard long, and of twenty-five pounds weight, and two or three hundred between two and three feet long, and which, as he was told, were of between fifty and sixty years standing.

Goethe mentions an instance of one that was one hundred years old; these were tame, and came to the shore in order to be fed, and swallowed with ease a piece of white bread of the size of a halfpenny roll. Ponds should be well supplied with water during the winter, and when they are covered with ice, holes should be opened every day for the admission of fresh air, through want of which carp frequently perish. See Carp Fishing, and Breeding of Fish.

For the general management of fish-ponds reserve some great waters for the head-quarters of the fish, whence you may take, or wherein you may put any quantity thereof; and take care to have lews, and other auxiliary waters, so that you may convey any part of the stock from one to the other, and lose no time in the growth of the fish, but employ the water as you do your land, to the best advantage. View the grounds, and find out some fall between the hills as nearly flat as may be, so as to leave a proper current for the water: if there be any difficulty in judging of such, take an opportunity, after some sudden rain, or the breaking up of a great snow in winter, and you will plainly see which way the ground calls, for the water will take the trench-fall, and run accordingly.

The condition of the place must determine the quantity of ground to be covered with water. For example, we may propose in all fifteen acres in three ponds; or eight acres in two, and no less; and these ponds should be placed one above another, so as the point of the lower may almost reach the head of bank of the upper; which contrivance is no less beautiful than advantageous.

The head or bank, which, by slopping the current, is to raise the water, and to make a pond, must be built with the clay and earth taken out of the pan or hollow day in the lowest ground above the bank: the shape of the pan is to be an half oval, whereof the flat is to come to the bank, and the longer diameter to run square from it. All fish-ponds should be drawn once in three or four years, and the fish fished; if it be a breeding-pond, the smaller fish should be taken out to flower other ponds with; and in feeding ponds all the fish should be kept as nearly as may be of a size, for the larger and smaller never all thrive well together.

Flounders will both thrive and breed in any pond, especially
specially in a clay pond, and will be much larger than in
rivers.

Bittern, herons, otters, water-rats, and gulls, are all
great destroyers of fish, and the ponds should be kept as clear
as possible of them; but the greatest of all destruction in
fish-ponds is occasioned by frosts.

To remedy this, some propose to break the ice and lay in
pipes, straw, and other things, to give air to the fish; but
all these fail when the ponds are foul; but when they are
clean, the fish seldom suffer any harm, be the frost ever so
long, though no holes be broke in the ice. The length of
foul water seems to be the occasion of the death of the fish,
in this case of its being locked up by frosts, and not the
want of air. The cleaning of ponds frequently is of great
use as well on this as on many other occasions; and it is
done at no expense, because the mud, serving as manure to
the lands, more than pays the expense of taking it out.

When the ground is boggy, and carts cannot come up
to the mud, it is best to cut the ponds long and narrow
in form of mounds, that it may be thrown out at one tos by
the labourers in clearing them; for if it require two toles,
the difference will be just the double price of labour.

In many situations where fish-ponds can be readily formed,
it may not unfrequently be advisable to have recourse to
them in the view of profit from the fish, and their conve-
ience in family use. It is not easy to ascertain what quan-
tity of produce, or profit, might be derived from ponds of
this description under different circumstances, as very few
experiments have yet been detailed from which conclusions
can be drawn. It would lead to much interesting informa-
tion on the subject, if the annual increase in the weight of
different sorts of fish, in different branches of their growth,
and under different circumstances of soil and water, were
correctly determined.

It has been stated by Mr. Lowden of Berkshire, in the
"Annals of Agriculture," that a pond of the extent of
three acres and a half, drawn, after three year's flocking
with flores of one year old, afforded 195 pounds weight of
carp, and 240 pounds weight of tench; which in the whole
was 425 pounds, which sold for twenty pounds ten shillings,
or nearly 2l. 6s. 6d. the acre per annum. And that the
same pond, when flocked with tench only, on being drawn
three years afterwards, produced about twenty-six pounds.
Therefore, supposing that, in a pond which supports two
thousand four hundred fish, half a pound be gained an-
ually, it will be 1000 pounds weight, which, at 6l. the
pond, will afford thirty pounds, and for fifteen acres, forty
shillings the acre; and when at 9l. the pond the three pounds
the acre.

As there is little trouble in this sort of farm management,
such profits should not be disregarded or overlooked in par-
icular situations. In the district noticed above, it is stated
that the usual price, when sold by the pound, is one shilling
for tench, and ten-pence for carp. And that this is the
best manner of disposing of them that can be adopted.
But when they are sold by the number, as per hundred, &c.
they are mostly measured from the eye to the tail, and dis-
posed of in this manner.

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In what relates to the proper flocking and managing of
ponds for the raising of fish, in the intention of deriving
advantage from the sale of fish much skill remains to be
accomplished before the greatest possible profit can be ob-
tained.

In different situations the methods of flocking are ex-
tremely different. It is the practice in Berkshire to flock
with carp and tench in the proportion of one hundred to
the acre, while in Suffolk they flock in the quantity of
seventy five brace to the acre. Stocking in too large a pro-
portion may be injurious to the profit, as fish require the
food to be abundant in most cases.

The forts of pond-fish most profitable to farming pro-
prieters, are probably those of carp, tench, perch, and occa-
sonally eels. But in thickly stocked ponds, the two last
forts should not be both admitted at the same time, as they
devour young fry very largely. Where ponds are large,
carp and tench answer well together; but in those of the
smaller kind, the former is apt to deprive the latter of its
food, in consequence of being too much more powerful.
Carp seldom affords much profit in small ponds, but tench
succeed well in those of almost any dimensions. Carp,
perch, and eels, sometimes answer pretty well together,
and likewise tench with eels. Where the ponds are but small,
the best practice is perhaps to keep the carp and tench se-
parate.

Carp frequently injure themselves by breeding, but this is
not often the case with tench.

The situations in which fish-ponds can be made, in the in-
tention of farm-profit, are principally in the dips, hollows,
and other parts of ground where the quality of the land is
very bad, but where there is the convenience of plenty of
water proper for the purpose.

In a national point of view, ponds of this sort can hardly
yet be considered of much importance, but they should not
be neglected by those who are engaged in the improvement
of landed property.

Though fish-ponds are numerous in many districts of the
kingdom, it is perhaps only in the counties of Suffolk and
Sussex that any thing like a system has been established for
raising fish with the intention of profit; but in those coun-
ties fish-ponds have long been formed for letting to dealers
in pond-fish, and flocking in order to the disposal of the
produce as an article of farm-flock, like that of any other
kind. It is not, however, improbable but that as the na-
ture and management of pond-fish become more perfectly
understood, such a practice may be considerably ex-

FISH-TOWN, in Geography, a town of Africa, at the
mouth of the river Calhuri.

FISKEROE, an isle or peninsula on the Laponic
shore, part of which belongs to Russian Lapland.

FISKO, a small island of Sweden, between the head
of Aland and the coast of Finland. N. lat. 60° 26'. E.
long. 25° 45'.

FISMES, a town of France, in the department of the
Marne, and chief place of a canton in the district of
Rheims, situated on the Velle; 17 miles N. W. of Rheims.
N. lat. 49° 18'. E. long. 4° 46'. The place contains 2126.
and the canton 11,152 inhabitants, on a territory of 1824 kilometres, and in 23 communes.

FISSATO, a sea-port town of Africa, in the country of Tripoli; 90 miles N.W. of Tripoli. N. lat. 33° 50'. E. long. 12.

FISSENIA, in Ancient Geography, a town of Asa, in Mesopotamia, seated on the Baxil or Royal river, towards Babylon.

FISSIDENS, in Botany, from fissur, cleaven, and dens, a tooth, an Hedwigian genus of moss, distinguished by its author, from his own Dictaum, only by the male flowers being axillary on the same plant with the female ones; a difference which, though corroborated by the habit in moss ears, is small, we think too difficult to be of any practical use. See DICTIONARY.

FISSLIA, from the fissile or easily cleaven corolla. Jul. 26. Wildb. Sp. Pl. v. 1. 194. Linnæus t. 28. An evergreen tree of the fice de Bourbon, where it is called fse de perspekt, because the smaller kinds of parrots are found of the fruit. The leaves are alternate, on short stalks, elliptico-lanceolate, entire, bluntish, thick and coriaceous, smooth, with one rib and a few flight veins. Stirpes none. Flowers axillary, somewhat racemose, occasionally solitary, on long smooth stalks, resembling those of an orange but smaller. Fruit a small drup, encompassed with the enlarged, cup-shaped, entire, permanent calyx.

This is the Olac fissaturnum of Valh's Enum. v. 2. 33. "Leaves ovate-oblong or lanceolate, slightly veiny. Branches round." See Olac, to which genus it is with indubitable propriety referred by Valh, though they are placed in two very different natural orders by Jussieu, who knew Olac but imperfectly. What he terms barren filaments in the leaf, Linæus, less authentically perhaps, takes for neculars.

FISSLUM-FOLIUM, a leaf that is cleaven, or divided vertically more or less deeply. See LEAF.

FISSURA, in Anatomy, a name given to several openings, particularly in the bones of the head; as the superior orbital fissure of the sphenoidal bone, the inferior-sphenomaxillary fissure formed between the sphenoid and superior maxillary bones, &c.

FISSURA Magna Sylvii, a division in the substance of the brain, separating the anterior from the middle lobe; See Brain.

FISSURE, a term in Surgery. All practitioners and authors have, from the earliest times, understood by the word fissure, a solution of continuity in a bone, having the appearance of a hair. Hence the expression rima capitularis, capitallar fissura, which, in short, is nothing more than a very fine, minute crack in a bone.

The old surgeons used to believe, that this sort of fracture took place both in the flat and the long cylindrical bones; and it was M. J. L. Petit, who first brought into doubt the opinion, in as far as it related to bones of the latter class. The subject was noticed by this writer, in his "Traité des Maladies des Os." In this work, he represents fractures, said to occur exactly in the direction of the length of the bones, as only imaginary. His reason for this sentiment is, that there is no force capable of breaking a bone in this way, which would not much more easily occasion a fracture of the transverse kind.

The signs of a fissure, as stated by Fabricius ab Aquapendente, are very equivocal and fallacious; he observes: "quod fios caecum longitudinum fractum fit, primó adept membra crassitatis ultra naturalem flatum, dieinde dolor, tum membra inequalitas." But all these symptoms, when they make their appearance, ought rather to be ascribed to the effects of the contusion, than to any other circumstance. It is also evident, on reading Fabricius ab Aquapendente, that he meant by a longitudinal fracture, what is now called, an oblique one. Indeed as M. J. L. Petit notices, Fabricius would never have advised extension to be made for a fracture which was exactly in the direction of the length of a bone, since this practice is obviously not applicable to the case, and he would never have recommended making pressure round the broken part, which could not be in a displaced condition, even were the bone actually fractured in a longitudinal manner. Davenery in his "Traité des Maladies des Os," has adduced no solid arguments in favour of the doctrine of longitudinal fracture. The reader may find the present subject very judiciously investigated at the beginning of M. J. L. Petit's work. It appears from the facts and reasons there brought forward, that, on the bones of the extremities a fissure can only occur, in cases of gunshot-wounds, where the splinters sometimes extend as far as the nearest joint. Such fractures are not easy of detection. They are most frequently attended with symptoms, arising more from the violence and shock always occasioned by gunshot injuries, and the consequent mischief excited in the substance or medullary structure of the bone, than from the particular nature of the fracture itself.

But though authors differ in opinion, in regard to fissures on the long cylindrical bones, they are all of one sentiment in acknowledging the occurrence of such fractures on the bones of the cranium, in consequence of blows upon the head. Here the accident is often termed by Latin writers fissura. The crack is either plainly perceptible, or scarcely discoverable; in which latter case, the expression of capillary fissura is often used. In both cases, the solution of continuity may take place, either precisely in the place against which violence has been directed, or at some other part of the skull. Encyclopédie Méthodique; Partie Chimurgicale. Art. Fissure.

FISSURE, in Geology and Mining, generally signifies the fame with Faults, which see; but Mr. W. Martin, a late, and generally a very correct writer, defines it (Outlines of the Knowledge of Extraneous Fossils, p. 172.) to mean, a partial and superficial rift, rarely extending through more than one stratum; which definition, by the notes in this page, is made to apply nearly to mineral veins; like those in the Limelime district of Derbyshire, and by which two things very different in their nature, and the mode and period of their formation, are confounded together, as we have observed, when treating of Faults.

FISSURE Fossils, in Mineralogy, or venous or venigenous minerals, are those found in veins or fissures, and which are generally crystallized in a more or less perfect state; see Venogenous Fossils, Riders, Veins, &c.

FISSURES, in the History of the Earth, certain interruptions that horizontally or parallelly divide the several strata of which the body of our terrestrial globe is composed.

FISTELLA, or FEZZA, in Geography, a town of Morocco, the inhabitants of which are rich, courteous, and warlike; 150 miles N.E. of Morocco.

FISTER, a town of Norway, in the diocese of Bergen; 16 miles N.E. of Stavanger.

FISTRITZ, or BYSTRIZIT, New, a town of Bohemia in the circle of Becin; 28 miles E. of Budawis. N. lat. 49° 35'. E. long. 15° 1'.

FISTRITZ, a river of Moravia, which runs into the Marive, near Olmaz.
FISTULA, in Antiquity, an instrument of wood used in driving piles, and fitted with two handles. It was either raised with pulleys fixed at the head of large beams, and then let fall again directly on the piles, or was wrought by the hand only.

FISTULA, Lat. a pipe, a flute, a flageolet, a whistle. FISTULA, in the Ancient Music, an instrument of the wind kind, resembling our flute or flageolet.

The principal wind instruments of the ancients were the tibia and fistula; though how these were constituted, or wherein they differed, or how they were played on, does not at present appear. All we know is, that the fistula was at first made of reeds, and afterwards of other matters. Some had holes, some none: some again were single pipes; others a combination of several; witness the lyreings of Pan.

FISTULA, Liturgical, was the pipe, being generally made of gold or silver, through which during several ages, persons who communicated under both kinds, drank out of the chalice. The use of it was retained in the Abbey of St. Denis, near Paris, as long as it subsisted, as likewise by the kings of France, when they received the sacrament at their coronation.

FISTULA Panis, Pan's pipe. See Syrinx and Syringa.

FISTULA, in Surgery, has usually been defined, "fistus anguli, callous, profundus; aci fanie diffusus;" or, as Dionis traduces it, "un ulceré profund, et cavernex, dont l'entree est étroite, et le fond plus large; avec siffue d'un pus acer et virulent; et accompagné de calloités." In the words of Mr. Pott, a fistula is "a deep, hollow, fore, or sinus, all parts of which are so hardened, or so disfigured, as to be absolutely incapable of being healed while in that state; and from which a frequent, or daily discharge is made of a thin, discoloured saps, or fluid."

A fistula generally leads down to some cavity, commonly situated in the cellular substance, between the integuments and muscles, or in the interfaces between the muscles themselves. The cavities with which fistula communicate are usually termed sinuses. These, in some measure, serve as receptacles for whatever matter is secreted by the pustules of the abscesses, and when pressure is made upon such sinuses, a much larger quantity of saps, or matter, flows out of the external fistulous opening, than appearances would induce one to expect.

The reader will excuse us from devoting much time to criticisms on the ordinary definitions of a fistula; but we cannot refrain from observing that a fistula might be better, and more simply called a narrow track or passage, leading from the seat of an abscess, giving vent to more or less of the matter outward, and having little or no tendency to heal. However, in cases of fistula in prime, and of those of the parotid duct, the foregoing definition will not be altogether accurate, since the fistulous passage leads from parts where urine and saliva exist, instead of pus. In the preface of surgery, so many disorders are termed fistulous, which have no claim to the appellation, (according to the strict sense of the expression,) not being accompanied with any callothytes or fanious discharge, that perhaps a surgeon would be less liable to imbibe erroneous notions from the signification which we have ascribed, than from the ancient one. We are ready to acknowledge, however, that almost all definitions are difficult, objectionable in some way or another, and exposed to controversy, and we gladly quit the subject ourselves, ever ready to retract our own explanations in favour of better ones.

The fistulous which are formed in cases of ulcers and abscesses are most frequently occasioned by the confinement of purulent matter, which readily makes its way in different directions in the cellular substance, which is the softest and most yielding part of the texture of the body. If a timely opening be made into abscesses, the formation of fistulas and sinuses is generally avoided. But though a puncture be made by the surgeon at a seasonable period, if the aperture should not be made in a depending situation, so that the mafs of pus cannot freely flow out, some of the matter will be continually oozing out in a flow way, prevent the part from healing, and be the cause of a fistula. The cavity of the abscess, in consequence of being kept for a considerable time indurated with matter, instead of contracting and granulating, will acquire a disfigured state, in which a thin fanious discharge will be emitted, and the parts lose all tendency to get well of themselves.

The foregoing observations are equally applicable to cases, in which an abscess bursts of itself, in a place which is very unfavourable for the escape of the pus.

Another circumstance under which fistulae are necessarily produced, is when a dead portion of bone, or some extraneous body lodged in the flesh, maintains a continual suppuration around it. In this sort of case, the opening by which the abscess first breaks never closes as long as the secretion of pus within goes on; the matter is every now and then oozing out, and the track through which it passes becomes fistulous.

No term in surgery has been so much misapplied as the word fistula; and since the expression has always conveyed to the practitioner's mind the idea of a disease attended with a great deal of callous induration, this abuse of language has too often led, especially in former days, to methods of treatment equally unceaseful, hurtful, and barbarous. Even at present, so many disorders are called fistulas without deferring the name, at least, without being accompanied with any callous hardnefs, that, as we have already said, young surgeons would avoid imbuing many prejudices, by merely considering the phrase "fistula," as implying an outlet for some discharge, which outlet, owing to some particular cause, has not much propensity to heal. The truth of what we have here remarked will be better seen, when the subjests of fistula in man, and fistula lachrymalis, are presently treated of.

We shall next notice some of the modes of treatment which have been put into practice for the purpose of curing fistulous complaints. Some of the plans alluded to may now be said to be exploded; but there is an advantage in knowing what has been done by our predecessors, and, for this reason, we shall enter into some details, which otherwise would not have been given.

In recent cases of fistulae, many writers have recommended what they call pulinary injections to be made use of, and when the disface is in a more advanced state, and the sides of the fistulous are length of time are in a callous state, ephrastic injections and powders are prescribed. Such applications, however, have seldom or never produced any real good effects, and the too frequent indiscriminate employment of them has often rendered sinuses hard and callous, which previously were by no means indurated to heal.

In all cases in which the sides of the fistulous are in an indurated callous state, we recommend laying open the cavity from one end to the other, and removing all such parts as have become hardened, so as to convert the whole diseased place into one wound, which is to be treated on common principles.

The
FISTULA.

The simple division of a fistula throughout its whole extent is, even at this day, the most approved plan of treatment generally speaking; but the additional method of cutting out all the surrounding indurated parts has long been abandoned by all good surgeons. The absurdity and bad effects of such treatment were well explained by Pott, in his treatise on the fistula in ano, and, since his time, the lamell practitioners in this country have not disagreed themselves by the performance of exactions of this nature.

Though there cannot be a doubt, that dividing fistula throughout their whole extent is generally the most eligible mode of cure, it must be acknowledged that, in certain instances, the strictest of the parts, the disagreeableness of the fear, and the degree of danger, are formidable objections.

For example, the practice of cutting thus extensively is not applicable to cases in which fistula extend a very considerable way up the rectum; and certainly no prudent surgeon would advise fistula to be cut open which run to an inordinate depth, and, as very often happens, below large blood-vessels, nerves, and tendons.

In these last-mentioned, and several other kinds of fistula, the French surgeons are advocates for the employment of a fetcum. They observe that the object in the treatment of all fistulous discharges, is to make the sides of the fissure adhere together, so that no cavity may remain. They state, that the most effectual plan of fulfilling this indication is first to make an opening on the most depending part of the fistula, in order to give free vent to the matter; and, secondly, by a gentle irritation to excite a certain degree of inflammation over the inner surface of the cavity. It is well known that in the inflammatory state, coagulating lymph is effused, and, becoming vascular, renders the sides of the fistula permanently adherent together.

According to the French writers, the two indications, just now specified, may be best fulfilled, in the majority of cases, by introducing a fetcum from the orifice of the fistula down to the very bottom of the fissure, where a counter-opening is to be made.

The fetcum should be made of silk or cotton, and more or less thick, according to the size of the fistula. The join of silk or thread is to be gradually lessened, as the cure advances, one or two threads being removed every two or three days. At length, when the cavity of the fissure is almost filled up, and the discharge has considerably diminished, the fetcum may be entirely removed. A moderately tight bandage over the dressings will then serve to complete the cure.

Sutures are not generally preferred for the cure of fistula by English surgeons. Indeed it is obvious, they can only be used when the whole course of the fistula can be traced with a probe, and its termination is so situated that a counter-opening can be made into it. This may be said never to be the case with fistula in ano.

The simple division of fistulous fissures is generally the most judicious mode of cure. It is only when a fistula runs under parts, which it would be dangerous or hurtful to cut, that the knife must give place to other means. A director, a crooked alligator, and a probe, are the instruments which are useful in dividing fistula.

Many fistula are kept up by the presence of extraneous bodies, dead pieces of bone, &c. In such instances, it is manifest that the accomplishment of a cure cannot be effected, either by objections, or laying open the fissure; but can only be obtained by the removal of the foreign substance, or detached portion of bone.

We shall now treat of the fistula in ano, fistula lachrymalis, and fistula in perineum, all which are surgical diseases of the greatest importance.

Fistula in ano.—Clear and precise definitions of diseases, and the application of such names to them, as are expressive of their true and real nature, are (says that celebrated surgeon Mr. Pott) of more consequence than they are generally imagined to be; untrue or imperfect ones occasion false ideas; and false ideas are generally followed by erroneous practice.

The same writer remarks that it would be no difficult matter to produce infirmities of disorders, whose treatment has, for a great length of time, been accommodated more to the titles imposed upon them, than to their true and real character. Amongst these, the fistula in ano is mentioned as a most glaring proof.

"The custom of giving the appellation of fistula to every impollution, and to every collection of matter formed near to the anus, has, by conveying a false notion of them, been productive of such methods of treating them, as (though perhaps suited to such ideas) are diametrically opposite to those which ought to be pursued; such as have often rendered these cases tedious and painful, which might have been cured easily and expeditiously; and, consequently, such as have brought disgrace on our art, and unnecessary trouble on mankind.

A small orifice or outlet, from a large or deep cavity, discharging a thin gleat or fawiness, made a considerable part of the idea which our ancestors had of a fistulous force, wherever slighted. With the term fistulous, they always connected a notion of callousness; and, therefore, whenever they found such a kind of opening yielding such sort of discharge, and attended with any degree of induration, they called the complaint a fistula. Imagining this callousness to be a diseased alteration made in the very structure of the parts, they had no conception that it could be cured by any means but by removal with a cutting instrument, or by destruction with eschars, and therefore they immediately attacked it with knife or cautery, in order to accomplish one of these ends; and very terrible work, by their own accounts, they often made, before they did accomplish it.

"Several of the above mentioned circumstances so frequently attend collections of matter near to the rectum; and therefore, for want of proper attention to the true nature of the case, the custom of calling them all fistule has generally prevailed, though without any foundation in truth or nature.

"That abscesses, formed near the fundament, do sometimes from bad habits, from extreme neglect, or from gross mis-treatment, become fistulous, is certain; but the majority of them have not, at first, any one character or mark of a true fistula; nor can, without the most supine neglect on the side of the patient, or the most ignorant mismanagement on the part of the surgeon, degenerate, or be converted into one.

"Collections of matter from inflammation, wherever formed, if they be not opened in time, and in a proper manner, do often burst. The hole, through which the matter finds vent, is generally small, and not often situated in the most convenient or most dependent part of the tumour; it therefore is unfit for the discharge of all the contents of the abscess; and, instead of closing, contracts itself to a smaller size; and, becoming hard at its edges, continues to drain off what is furnished by the undigested sides of the cavity.

"This is often the case in the most muscular or fleshy parts of the body, where the cellular and adipose membranes, 

"
but altered more... 

After taking notice of the frequency of abscesses about the anus, and their being attended with considerable induration, which does not subside, particularly when they have been allowed to burst of themselves, Mr. Pott remarks that the smallness of the accidental orifice, the hardfoc of its edges, its being found to be the outlet from a deep cavity, its discharging every day a thin, glistening, discoloured kind of matter, attended with great induration of the surrounding parts, are all of them circumstances tending to confirm the idea of a true fistula.

"To this idea (says Mr. Pott) the general treatment of these cases has therefore been made to accord; upon this there has been built the prevailing doctrine of free excision, or as free destruction, without any regard to the original production of the complaint, its particular seat, its date, or any other attendant circumstances; and without examining whether it would not admit a more easy and a more expedient method of cure. In short, this notion, that all fistulas near the rectum are necessarily fistulous, has occasioned the prescription of such a manner of treating them, from their very first appearance as they can hardly ever stand in need of at any time; and a more ill founded supposition that the induration of the parts about may be owing to a diseased callous, is urged as a reason for using them with more severity than even such a fistula would require."

Mr. Pott next observes, that whoever would obtain a true notion of the disease in question, must consider it under all the forms in which it makes its appearance. These, which are many and various, both with regard to aspect, situation, and symptoms, are what shew the different nature of the complaint in different states, and are the circumstances which ought to regulate a surgeon's conduct in the cure of it.

Sometimes (says Mr. Pott) the attack is made with symptoms of high inflammation; with pain, fever, rigor, &c. the fever subsiding as soon as suppuration is fully established.

"In this case, a part of the buttock, near to the anus, is considerably swollen, and has a large, circumfered hardnes. In a short time, the middle of this hardnes becomes red and inflamed; and, in the centre of it, matter is formed.

"This, in the language of our ancestors, is called in general a phlegmon; but, when it appears in this particular part, a phyma.

"The pain is sometimes great, the fever high, the tumour large, and excessively tender; but however disagreeable the appearances may have been, or however high the symptoms may have risen before suppuration, yet, when that end is fairly and fully accomplished, the patient generally becomes easy and cool, and the matter formed under such circumstances, though it may be plentiful, yet is good.

"On the other hand the external parts, after much pain, attended with fever, sickness, &c. are sometimes attacked with considerable inflammation, but without any of that circumfered hardnes, which characterized the preceding tumour; instead of which, the inflammation is extended largely, and the skin wears an erysipelasious kind of an appearance. In this the disease is more superficial, the quantity of matter small, and the cellular membrane floughy to a considerable extent.

"Sometimes, instead of either of the preceding appearances, there is formed in this part what the French call une suppuration gangreneuse; in which the cellular and adipose membrane is affected in the same manner as it is in the disease called a carbuncle.

"In this, the skin is of a dusky red, or purple kind of colour, and although harder than when in a natural state, yet it has by no means that degree of tension or resilience which it has in either the phlegmon, or in the erysipelas.

"The patient has generally at first a hard, full, jarring pulse, with great thrill, and very fatiguing reflexes. If the progress of the disease he not stopped, or the patient relieved by medicine, the pulse soon changes into an unequal, low, flushing one; and the strength and the spirits sink in such manner as to imply great and immediately impending mischief. The matter formed under the skin to altered is small in quantity, and bad in quality; and the adipose membrane is gangrenous and floughy throughout the extent of the discolouration. This generally happens to persons whose habit is either naturally bad, or rendered so by intemperance.

"In each of these different affections, (continues Mr. Pott) the whole malady is often confined to the skin and cellular membrane underneath it; and no other symptoms attend than the usual general ones, or such as arise from the formation of matter, or floughs in the part immediately affected. But, it also often happens, that, added to these, the patient is made unhappy by complaints arising from an influence, which such mischief has on parts in the neighbourhood of the disease; such as the urinary bladder, the vagina, the urethra, the hemorrhoidal vessels, and the rectum; producing retention of urine, strangury, dysuria, bearing down, tenesmus, piles, diarrhoea, or obdurate colicines: which complaints are sometimes so prelaging, as to claim all our attention. On the other hand, large quantities of matter and deep floughs are sometimes formed, and great devastation committed on the parts about the rectum, with little, or no previous pain, tumour, or inflammation.

"Sometimes the disease makes its first appearance in an induration of the skin near to the verge of the anus; but without pain or alteration of colour, which hardfoc gradually foften and suppurate. The matter, which, when let out, in this case, is small in quantity, good in quality, and the face is superficial, clear, and well conditioned. On the contrary, it now and then happens, that, although the pain is but little, and the inflammation apparently slight, yet the matter is large in quantity, bad in quality, extremely offensive, and proceeds from a deep, rude hollow, which bears an ill-natured aspect.

"The place, also, where the abscess points, and where the matter, if left alone, would burst its way out, is various and uncertain. Sometimes it is in the buttock, at a distance from the anus; at other times near its verge, or in the perineum; and this discharge is made sometimes from one orifice only, sometimes from several. In some cases, there is not only an opening through the skin externally, but another through the intestine into its cavity; in others there is only one orifice, and that either external or internal.

"Sometimes the matter is formed at a considerable distance from the rectum, which is not even laid bare by it; at others it is laid bare only, and not perforated; it is also sometimes not only demulced, but pierced; and that in more places than one. The original seat of this mischief is, in some cases, high up in the pelvis, near the lower vertex of the loins, and the os sacrum; and the matter comes from parts so dissected, and so out of reach, that the case is hopeless from the first."

We shall here avoid inferring a few remarks, which Mr. Pott...
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Pott has next added, for they seem to rest on doctrines which are now generally abandoned. The different cases which have been mentioned show that there is a great variety of flates and circumstances, and that the disease must of course have the treatment varied accordingly. When inflammation attacks the cellular substance surrounding the rectum, suppuration can very seldom be prevented from taking place. In conformity to the advice of Mr. Pott, therefore, the best practitioners seldom have any object of this kind in view; but, when called at an early period of the affection, endeavour to moderate the symptoms, promote suppuration, open the abscess, so soon as the matter is formed, and treat the sore in such manner as shall be likely to produce a speedy and lasting cure.

Mr. Pott remarks: when there are no symptoms which require particular attention, and all that we have to do is to aid the maturation of the tumour, a soft poultice is the ball application. When the disease is fairly in the phlegmonous kind, the thinner the skin is suffered to become, before the abscess is opened, the better; as the induration of the parts about will thereby be more dissolved, and, consequently, there will be the less to do after such opening has been made. This kind of tumour is generally found in the condition of full, famine habits; and, who, therefore, if the pain be great and the fever high, will bear evacuation for both by phlebotomy and gentle cathartics; which is not often the case of those who are said to be of bilious constitutions; in whom the inflammation is of larger extent, and in which the skin wears the yellowish tint of the erysipelas: persons of such kind of habit, and in such circumstances, being in general seldom capable of bearing large evacuation.

According to Mr. Pott, the erysipelatous inflammation generally makes its attack with nausea, vomiting, light rigour, heat, thirst, and reftlesness.

"The quickness of the pulse, and heat of the skin (fays this distinguished surgical writer) are indications for some degree of evacuation, and, indeed, sometimes render it requisite; but, it is a very prevailing opinion with many practitioners, that these evacuations should be freely made, and frequently repeated; in short, that the cure of this kind of inflammation is safely to be effected by them; which is so far from being true, that the practice has proved fatal to many. If, for instance, blood be drawn off in such quantity, as that the patient's pulse licks suddenly, or his strength be considerably reduced by purging, it is no very uncommon thing for the inflammation to leave the part first attacked; and for such complaints to come on immediately, as soon prove destructive, and afford no opportunity to repair the mischief which the evacuation has produced.

"When the inflammation is of this kind, the quantity of matter formed is small, compared to the size and extent of the tumour; the disease is rather a floughy, putrid state of the cellular membrane, than an suppuration; and, therfore, the sooner it is opened, the better. If we wait for the matter to make a point, we shall wait for what will not happen, at all, but till after a considerable length of time, during which, the disease in the membrane will extend itself, and consequently, the cavity of the flans, or abscess, he thereby greatly increased.

"When, instead of either of the preceding appearances, the skin wears a dusky purplish, red colour; has a doughy, unyielding kind of feel, and is very little sensible; when these circumstances are joined with unequall, faulting kind of pulse, irregular shiverings, a great failure of strength and spirits, and inclination to doze, the case is formidable, and the event generally fatal.

"The habit, in these circumstances, (continues Mr. Pott) is almost bad; sometimes from nature, but much more frequently from gluttony and intemperance. What affinities art can lend must be administered speedily; every minute is of consequence; and, if the disease be not stopped, the patient will sink. Here is no need for evacuation of any kind; recourse must be immediately had to medical affinities; the part affected should be frequently fomented with hot spirituous fomentations; a large and deep incision should be made into the diseased part; and the applications made to it should be of the warmest, most antiseptic kind."

Mr. Pott afterwards notices the occasional occurrence of strangury, dysuria, and a total retention of urine, when abscesses form in the neighbourhood of the rectum and bladder, particularly, when they are situated near the neck of the latter part. Such complaints may continue from the first attack of the inflammation till the abscess breaks; or they may only last a few hours.

"Mr. Pott observes, attacks of grey and dysuria in general are easily relieved by bleeding, emetic astringents, and nitre, "But (says he) the total retention (of urine) is, while it continues, both fatiguing and alarming, They, who have not often seen this case, generally have immediate recourse to the catheter; and for this they plead the authority of precept, but, the practice is so essentially wrong, and I have seen such terrible consequences from it, that I cannot help entering my protest against it.

"The neck of the bladder, from its vicinity to the parts where the inflammation is seated, and from its being involved in the same common membrane, does certainly participate, in some degree, of the said inflammation. This will, in some measure, account for the complaint; but, whoever considers the extremely irritable state of the parts compounding that part of the urethra, (if I may be allowed to call it,) and will, at the same time, reflect on the amazing and well-known effects of irritation, will be convinced, that the principal part of this complaint arises from that cause; and that the disease is, strictly speaking, spasmodic. The reasons in which an attack of this kind is generally made, the very little dilation which the bladder often suffers, the small quantity of urine sometimes contained in it, even when the symptoms are most sufficient, and the most certain as well as safe method of relieving it, all tend to strengthen such opinion.

"But (proceeds Mr. Pott) whether we attribute the evil to inflammation, or to a spasmodic irritation, whatever can, in any degree, contribute to the exacerbation of either, must be palpably and manifestly wrong. The violent passage of the catheter through the neck of the bladder, (or violent in such circumstances it must be,) can never be right. I will not say, that it never succeeds; but I will say, that it can hardly ever be proper to make the attempt.

"If the instrument be successively introduced, it must either be withdrawn as soon as the bladder is emptied, or it must be left in it; if the former be done, the same cause of retention remaining, the same effect returns; the same pain and viole we must again be submitted to under (most likely) increased difficulties. On the other hand, if the catheter be left in the bladder, it will often, while its neck is in this state, occasion such disturbance, that the remedy, (as it is called,) will prove an exacerbation of the disease, and add to the evil it is designed to alleviate. Nor, is this all; for the resistance which the parts, while in this state, make, is sometimes so great, that if any violence be used, the instrument will make for itself a new route in the neigh-
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louring parts, and lay the foundation of such mischief as frequently baffles all our art—an accident, (fays Mr. Pott,) which I have known to happen to those, whose judgment and dexterity have never been doubted."

Mr. Pott remarks, that the true, safe, and rational method of relieving this complaint is by evacuation and anodyne relaxation: this not only procures immediate ease, but does at the same time serve another very material purpose, which is that of maturating the abscesses. Lots of blood is necessary; the quantity to be determined by the strength and state of the patient. The intelles should also be emptied, if there be time for doing, by a gentle cathartic: but, (fays Pott,) the most effectual relief will be from the warm bath or fomentum, the application of blisters with hot water to the pubes and perineum; and, above all other remedies, the injection of clysters, consisting of warm water, oil, and opium.

For the painful tenesmus, which is no uncommon attendant on inflammations about the rectum, Mr. Pott recommends a dose of rhubarb, joined with some warm monody. And if this plan fail, he prefers fresh clysters with opium.

The bearing down in women may be cured by the same means.

For the obstinate colliquenes, and piles, which sometimes accompany abscesses about the rectum, Mr. Pott advises phlebotomy, laxative clysters, and a low cool regimen; a soft poultice being externally applied, which softens the indurated piles, and promotes suppuration.

We shall now follow Mr. Pott in considering this disease, when the first symptoms attending the inflammation are gone off, and matter is either formed and collected, so as to require being let out, or this last step having been neglected, the pus has made its own way out.

Mr. Pott reduces all cases of this class to two general heads:

1. Thofe-instances in which the intelle is not at all interfered.

2. Thofe in which it is either laid bare, or perforated.

When the matter is fairly formed, makes a point, and requires being let out, the opening ought always to be made where such point is situated, where the skin is most thin, and the fluctuation most palpable.

Mr. Pott, after considering the plan of opening abscesses about the anus, exposes the absurdity of the opinion once prevalent, that an abscess, opened by a knife, must be immediately examined and fluffled with dressings, while that, on which a cautery has been applied, must be let alone, until the effcor is cast off. "Let the one be treated as the other is, (observes this eminent surgeon,) and as they both ought to be, and the event will be found to be alike in each; excepting this material difference in favour of the knife, that it will not necessarily occasion any destruction of parts, lots of substantia, nor any deformity, which is at all comparable with what must follow the use of the cautery.

"In making the opening, the knife or lancet should be put in deep enough to reach the fluid, and, when it is in, the incision should be continued upward and downward, in such a manner as to divide all the skin covering the matter. By these means, the contents of the abscess will be discharged at once; future lodgment of matter will be prevented; convenient room will be made for the application of proper dressings; and there will be no necessity for making the incision in different directions, or for removing any part of the skin composing the verge of the anus."

Mr. Pott has explained with great ability, that though all abscesses of this kind are called fistula, and have been supposed to effect the rectum, yet the place where the matter is formed is at such a distance from the intelle, that the latter part cannot be at all concerned, and none of these cases are, in the first instance, fistula. It does not follow, as a matter of course, that we have any thing to do with the rectum at all, not more than if it were not near the disease, which should be regarded and treated as a common abscess.

It is accurately observed by the celebrated surgical writer, whose remarks are freely quoted in this article, that wherever matter is formed in consequence of inflammation, it always leaves, upon being let out, a proportional hollow, and some degree of induration. The former of these is of different size, according to the quantity of matter, and the latter depends both on the degree of previous inflammation, and the more or less perfect suppuration of the abscesses.

The idea, formerly attached to the two circumstances of hollow and hardmess, was, that the fist arose entirely from lots of suffinace; the second, from a diseased alteration of the parts. Hence preceding surgeons, as soon as they had discharged the matter, used to fill and dilate the cavity, with a view of obtaining a gradual regeneration of flesh, and the dressings were generally of an escharotic quality, intended for the dissolution of the hardness.

"The practice (says Mr. Pott) is a necessary consequence of the theory. Whoever supposes diseased callousity, and great lots of suffination, will necessarily think himself obliged to destroy the former, and prevent the cavity formed by the latter from filling up too hastily. On the other hand, he who considers this matter as it really is, that is, he who regards the cavity of the abscess as being principally the effect of the gradual diminution and suppuration of its fides, with very little lots of suffination, compared with the size of the said cavity; and who looks upon the induration round about as nothing more than a circumstance which necessarily accompanies every inflammation in membraneous parts, especially in those which tend to suppuration, will, upon the smallest reflection, perceive, that the dressings applied to such cavity ought to be so small in quantity, as to permit nature to accomplish that end which she always aims at, as soon as the matter is let out; I mean, says Pott, the approach of the sides of the cavity toward each other; and that such small quantity of dressings ought to consist of materials proper only to encourage easy and gradual suppuration.

"The fact is so obvious to common sense, that it must appear to every one, who will coolly and impartially consider it."

"What is the part in which the disease is seated? and what are the alterations which such disease produces? The part is mere cellular membrane; and the alteration is obstruction and inflammation, ending in the formation of matter. But do these create any new body? Do not the sides of the abscess still remain cellular and adipose membrane, only inflamed, thickened, hardened, and rendered purulent? Can such alteration require any thing more towards refilling the parts to a natural state than a free suppuration from the parts so altered? Or, can it make extirpation or destruction necessary? Most certainly it cannot. How then is suppuration to be produced and maintained? Not by thrusting in such applications as by their quantity dilute, and by their quality irritate and destroy; but by dressing lightly and easily with such as appease, relax, and soften."

When an abscess near the anus is opened, the cavity, as Mr. Pott observes, is found proportioned to the quantity of matter. If the hollow be immediately filled with dress-
ings of any kind, the sides of it will be prevented from approaching toward each other, or may even be farther separated. But, if this cavity be not filled, or have little or no dressings of any kind introduced into it, the sides immediately collapse, and, coming nearer and nearer, do, in a very short time, convert a large hollow into a small fissure. The same thing happens when the collection of matter has built of itself.

Mr. Pott acknowledges, that the fissure will not always become perfectly closed, particularly in cases of fistula in ano; but, still he contends, that the conduct of nature is not the least evident, nor the hint, which art ought to borrow from her, the less palpable.

Whenever extensive ulcers or cavities exist, whether in cases of fistula in ano, or other disorders, much will depend upon the patient's constitution, and the care taken of it. When the habit is good, or properly corrected, any dressings which are not offensive in quantity or quality will prove effective; but if the constitution be out of order, or badly treated, the surgeon may try (as Mr. Pott remarks) the whole farrago of externals, and only walle his own and his patient's time.

This able writer explains, that all those cases are at first mere absceses; the consequences of inflammation; and require no other treatment than what would be proper in the same kind of case in all other parts. Some few of them are so circumstanced, with regard to the intestine, that it is certain unnecessary to meddle with it at all, but whether that be the case or not; whether the division of the rectum become a necessary part in the cure or not; they must certainly do not preserve the name of fistula, nor require that of treatment which fillulce are said and thought to stand in need of; though by being, from their very first appearance, supposed to be such, they are frequently, by mismanagement, rendered truly fissile.

By light, easy treatment, says Mr. Pott, large abscesses, formed in the neighbourhood of the rectum, may sometimes be cured without meddling with this intestine at all. But it much more frequently happens that the intestine, although it may not have been pierced by the matter, has yet been so demurred, that no consolidation of the fissure can be obtained except by laying the cavity of the abscess, and that of the intestine, into one.

Sometimes the practitioner may perceive the necessity for such a division at first; that is, on opening the abscess he may find the intestine so bare, that it is evident no cure can be accomplished without this operation. In other instances reasonable hopes of success may be entertained at first; but they may end in disappointment.

Mr. Pott observes, that when the gut is found to be in such state, that there is no reason to expect a cure without its being divided, that operation had better, on many accounts, be performed at the time the abscess is first opened, than be deferred to a future one. When done, as it always may be done, the pain which the patient must feel when the abscess is opened will be so trivially increased, that the difference will hardly be distinguished, either with regard to time or sensation. If the division be delayed, the patient must either be under the continual apprehension of a second cutting, or suffer one when he does not expect it.

The object of the operation is to divide the rectum from the verge of the anus as high as the top of the hollow in which the matter is formed, so as to lay the two cavities of the gut and abscesses into one; and by means of an open, instead of a hollow or fissure fore, to obtain a firm and lasting cure.

The best instrument for the operation is the curved, probe-pointed knife, which, being introduced into the fissure, while the surgeon's fore finger is in the intestine, will enable him to divide all that can ever require dividing; and that with less pain to the patient, with more facility to the operator, as well as with more certainty and expedition, than any other instrument whatever. If there be no opening in the intestine, says Mr. Pott, the smallest degree of force will thrust the point of the knife through, and thereby make one: if there be one already, the same point will find and pass through it. In either case it will be received by the finger in ano; and thereby be prevented from deviating; and, being brought out by the same finger, must necessarily divide all that is between the edge of the knife and the verge of the anus; that is, by one simple incision, which is made in the smallest space of time imaginable, lay the two cavities of the fissure and of the intestine into one.

With respect to the distinction between those cases in which the intestine is pierced by the matter, and those in which it is not, although it may be useful when the different flates of the disease are to be determined, yet, in practice, as Mr. Pott observes, when the operation of dividing the intestine becomes necessary, each division is of itself distinct; it makes no difference at all; nor does the kind, or quantity of force which the patient is to feel, the force required to push the knife through the tender gut is next to none; and, when its point is in the cavity, the cases are exactly similar.

Immediately after the operation, Mr. Pott recommends a soft dressing of fine lint to be introduced from the rectum, between the divided lips of the incision, as well to prevent any flight hemorrhage, as to prevent the immediate reunion of the said lips; and the rest of the force should be lightly dressed with the same. This first dressing should be permitted to continue, until a beginning suppuration renders it loose enough to be taken away easily; and all the future ones should be as light, soft, and easy as possible; confining only of such materials as are likely to promote kindly and gradual suppuration. Mr. Pott remarks, the sides of the abcesses are large; the incision must necessarily for a few days be inflamed; and the discharge will for some time be discoloured and scabby. This inflammation, and this sort of discharge, are often mistaken for signs of disfigured caries and uncovered fissure; upon which pretension, escharotics are freely applied, and diligent search is made for new hollows. The former of these, as Mr. Pott relates, must commonly increase both the hardness and the gleet, and, by the latter, new fissures are sometimes really produced. These occasion a repetition of escharotics, and, perhaps, of incisions; by which means, cases which at first, and in their own nature, were simple and easy of cure, are rendered complex and tedious.

Mr. Pott censures, in strong terms, the former custom of applying to the wound the hydrargyrum nitricus ruber, and other escharotic powders. What, says this writer, would any patron of this method of dressing say to a man, who shall order a large tent, well charged with red precipitate, to be thrust up the undivided, unwounded rectum of a person who, from any cause whatever, had an inflammation of the hemorrhoidal vesel, and inside of the said intestine? Would be not say that such tent would prove a fatiguing inflammatory suppuration? And would he not be right in saying so? Is then the rectum rendered less sensible and less irritable by being wounded? or, can that very application, which proves a painful stimulus to a gut not divided, become an easy digestive to one that is? If any man thinks that it will, Mr. Pott would advise him to make the expen-
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With regard to the plan of curing fistulae in ano in this state, by incision, the same method should be followed as the one already recommended in the case of a collection of matter formed juxta anum.

Notwithstanding the opinions of some former very eminent surgeons, such as Chevelden, De la Faye, and Le Dran, that the mere division of the intelleil and filns would not effect a cure, and, that unless we cut out or extirpated a portion both of the intelleil and the skin of the anus, durable relief would not be obtained, it was ably contended by Mr. Pott, and all experience strongly supports him, that the destruction of any of the parts is not only unnecessary, but injurious. As such practice is now gone completely out of vogue, we need not take up any more time in expressing our disapprobation of it.

When the fistula extends high up the rectum, further than the finger introduced within the anus can reach, it is found to be quite unnecessary to divide the intelleil throughout its whole length, even were such proceeding practicable and free from danger. If the surgeon fairly divide that part of the fistula and intelleil which he can conveniently reach with his finger, he need not concern himself about the deeper part of the disease, as in general a cure will follow without further trouble, in relation to any operation. The experience of Pott taught him this important fact, and succeeding practitioners have daily opportunities of verifying the same truth confirmed.

Thus far we have followed Mr. Pott in considering the disease either as an abscess from which the matter has been let out by an incision made by a surgeon, or from which the contents have been discharged by one single orifice, formed by the bursting of the skin somewhere about the fundament. We shall now pursue the same writer's plan, and consider the case, in which, instead of one, there are several openings.

"This state of the case," observes Mr. Pott, "generally happens when the quantity of matter collected has been large, the inflammation of considerable extent, the abdoine membrane very flabby, and the skin worn very thin before it burst. It is indeed a circumstance of no real consequence at all; but from being misunderstood, or not properly attended to, is made one of additional terror to the patient, and additional alarm to the inexperienced practitioner; for it is taught, and frequently believed, that each of these orifices is an outlet from, or leads to, a distinct sinus or hollow; whereas, in truth, the case is most commonly quite otherwise. All these openings are only so many distinct hurdles of the skin covering the matter; and do all, be they few or many, lead and open immediately into the one single cavity of the abscess; they neither indicate, nor lead to, nor are caused by, distinct sinuses; nor would the appearance of twenty of them (if possible) necessarily imply more than one general hollow.

"If this account be a true one, it will follow, that the chirurgical treatment of this kind of case ought to be very little, if at all, different from that of the preceding; and that all that can be necessary to be done, must be to divide each of these orifices in such manner as to make one cavity of the whole. This the probe-knife will easily and expeditiously do; and, when that is done, if the sore, or more properly, its edges, should make a very ragged, uneven appearance, the removal of a small portion of such irregular angular parts will answer all the purposes of making room for the application of the dressings, and for producing a smooth, even cicatrix after the sore shall be healed.

"When a considerable quantity of matter has been recently let out, and the internal parts are not only in a crude,
undigested flake, but have not yet had time to collapse, and approach each other, the inside of such cavity will appear large; and if a probe be pushed with any degree of force it will pass, in more than one direction, into the cellular membrane by the side of the rectum. But, (continues Mr. Pott,) let not the unexperienced practitioner be alarmed at this, and immediately fancy that there are for any dilated fistulas, neither let him, if he be of a more hearty disposition, go to work immediately with his director, knife, or scissors; let him enlarge, the external wound by making his incision freely; let him lay all the separate orifices open into that cavity; let him divide the intestine lengthwise by means of his finger in ano; let him dress lightly and easily; let him pay proper attention to the habit of the patient; and wait and see what a few days, under such conduct, will produce. By this he will frequently find, that the large cavity of the abscesses will become small and clean; that the induration round about will gradually lessen; that the probe will not pass in that manner into the cellular membrane; and, consequently, that his fears of a multiplicity of sinuses were groundless. Or, the contrary, if the sore be crammed, or dulled with irritating or ecarhotic medicines, all the appearances will be different, the hardnew will increase, the lips of the wound will be inverted, the cavity of the sore will remain large, crude, and foul; the discharge will be thin, gleyty, and discoloured; the patient will be uneasy and feverish; and if no new cavities be formed by the new fistulas, the parts, and confinement of matter, yet the original one will have no opportunity of contracting itself, and may very possibly become truly fistulous.

Without positively denying that there is ever more than one sinus extending along the same side of the rectum, Mr. Pott maintained, that for one instance in which the case is really so, forty are only suppositions of his. He allows that separate openings in the skin, from the same cavity or sinuses, are common; but denies that perfectly distinct sinuses, running along the same side of the rectum, are at all usual.

Sometimes the matter of an abscess, formed in the neighbourhood of the anus, instead of making its way through the skin, externally near the anus, or in the buttock, pirces through the intestine only. This is what is called a Fistula interna fistula. In this instance, when the matter has discharged itself, the feeling subsides, and the patient experiences some degree of relief. If the evacuation of the matter does not terminate in a cure, which sometimes, though very seldom happens, some small degree of induration generally remains in the place where the original tumour was. As Mr. Pott describes, when this hardness is pressed upon, a small discharge of matter is frequently made per annum; and sometimes the expulsion of air from the cavity of the abscess into that of the intestine may very palpably be felt and clearly heard. The fluids, particularly if hard, and requiring force to be expelled, are sometimes smeared with matter; and although the patient by the burbling of the abscess is relieved from the acute pain which the collection occasioned, yet he is seldom free from a dull kind of uneasiness, especially if one fits on any considerable length of time in one orifice. Mr. Pott remarks, that the real difference between this kind of case, and that in which there is an external opening, with regard to the method of cure, is very immaterial; for an external opening must be made, and then all difference ceases. In this, as in the former, no cure can reasonably be expected, until the cavity of the abscess, and that of the rectum, are made one; and the only difference is, that in one case we have an orifice at or near the verge of the anus, by which we are immediately enabled to perform that necessary operation; in the other, we must make one.

We have next to treat of that state of the disease which really deserves the epithet of fistulous, according to the common definition. Mr. Pott observes, that various causes may produce such a condition of the parts concerned. These causes are divided by this celebrated surgeon into two classes, viz. those which are the effect of neglect, dishonoured habit, or of bad management, and which may be called, without any great impropriety, local fistulas; and those which are the consequence of disorders, whose origin and seat is not in the immediate sinuses or fistula, but in parts more or less distant, and which, therefore, are not local complaints.

The former are generally curable by proper treatment; the latter are frequently irrecoverable by any means whatever.

In the first description of cases, Mr. Pott ranks all those which were originally mere collections of matter within the costs of the rectum, or in the cellular substance surrounding this intestine, but which, by being long neglected, grossly managed, or by happening in habits which were disordered, and for which disorders no proper remedies were administered, suffer such alteration, and get into such state, as to deserve the appellation of fistula.

In the second kind of cases, Mr. Pott classes all those in which the disease has its origin and fist state in the higher and more distant parts of the pelvis, about the os sacrum, lower vertebral of the loins, and adjacent parts; and are either Bumous, or the consequence of long and much disordered habits; or the effect of, or combined with other duetemper, local or general, such as a diseased neck of the bladder, or prostate gland, or urethra; the lues venera, &c.

Mr. Pott notices, that among the very low people who are brought into hospitals, we frequently meet with cases of the first description; cases which at first were mere simple fistulas, but which, from uncleanness, from intemperance, negligence, and displeased constitutions, become really fistulous.

In these examples the general effects of intemperance, debauchery, and constitutional disease, are to be corrected, or removed, before surgery can afford any material relief.

When these great objects have been attended to, the surgery required consists in laying open and dividing the sinus or fistulas in such manner, that there may be no possible judgment of matter, and that such cavities may be fairly opened lengthwise into that of the rectum. If the internal parts of these hollows are hard, and do not furnish good matter, Mr. Pott advises us to scartify them with the point of a knife, but not to use ecarhotic applications. When, either from the multiplicity of external orifices, or from the looses, flapby, hardened, or inverted state of the edges of the wound, near the same, no hopes of healing the parts in an easy way can be entertained; such a portion of them may be cut away as will just serve that purpose. Mr. Pott recommends the dressings to be soft, easy, and light.

When the abscess is in the sinus, and the exterior of the skin is occupied with fungous flesh, a slight touch of the lunar caustic may become necessary.

In the mean while, the remedies for the improvement of the fucose must be continued, and local means alone not trusted.

When the bad state of the fistula arises from the manner in which it has been eamed, irritated, and eroded, leaving
off such treatment must of course be the means of bringing the discharge into a better condition.

Mr. Pott remarks, that a patient who has been so treated has generally some degree of fever, has a pulse, which is too hard and too quick, is thirsty, and does not get his due quantity of natural rest. A face which has been so dressed has generally a considerable degree of inflammatory hardness round about; the lips and edges of it are tumid, full, inflamed, and sometimes inverted; the whole verge of the anus is swollen; the hemorrhoidal vesicles are loaded; the discharge from the face is large, thin, and discolored; and all the lower part of the rectum participates in the inflammatory irritation, producing pain, bearing-down, tenesmus, &c. Contraria contraria (continues this able writer) is never more true than in this instance; the painful uneasy state of the face, and of the rectum, is the great cause of all the mischief, both general and peculiar; and the first intention must be to alter that. All excreta must be thrown out and diffused; and in lieu of them a soft digestive should be substituted, in such manner as not to cause any distention, or to give any uneasiness from quantity. Over this a poultice should be applied. These dressings should be renewed twice a day; and the patient should be enjoined absolute rest. At the same time attention should be paid to the general disturbance which the former treatment may have created. Blood should be drawn off from the fanganes; the feverish heat should be calmed by proper medicines; the languid and low should be allied with the bark and cordials; and ease in the parts must at all events be obtained by the injection of antiseptic ointments of tincture and opium.

If, as Mr. Pott observes, the sinus has not yet been laid open, and the bad state of parts is occasioned by septic or atypical applications, no operation of any sort should be attempted, until both the patient and the parts are safer, cooler, and quiet. When this digestible change has taken place, the sinus may be successfully divided, and, if requisite, a small portion of the ragged edges be taken away.

Lumbar abscesses sometimes form sinuses, which run down by the side of the rectum, and burst near the fundament. The discharge from these is generally large, feculent, thin, and sharp. Hence, we cannot wonder that the sinuses and orifices become hard and callous; that is, truly fibrous. But it must be obvious to every one (says Mr. Pott) who will consider it, that the surgical treatment of these sinuses and sinuses can be of very little consequence towards curing the discharges from which they arise, and which are generally out of the reach of our instruments and applications. The proper treatment of such disorders will be spoken of in another part of the Cyclopædia. See Lumbar Abscess.

Cancers and cancerous faces are sometimes formed in the cavity, or the neighbourhood of the rectum and fundament, where they make terrible havoc. See Rectum.

Fibrous abscesses are sometimes formed in the region of the bladder and urethra, and are named fistula in perineum, require separate and particular consideration, into which we shall presently enter. Pott's Treatise on the Fistula in Ano.

Fistula Lacrymalis.—Every one who has acquired that degree of anatomical knowledge which is essentially requisite in a good surgeon, is well aware that the tears and sebaceous fluid with which the surface of a healthy eye is naturally kept in a moist flake, are conveyed, as long as they become superficial, through certain tubes or ducts, down into the nose. We leave it to the anatomist and physiologist to determine, whether it is by some action like that of a fly's ringe, or of a capillary tube, or whether it is by the mucular power of the lacrimal passages themselves, that the tears are made to descend from the eye into the cavity of the nose. The secretion from the lacrimal gland, membranous lining of the eyelids, and Meibomian glands, constitutes what is commonly called the tears, the use of which is to lubricate the eye in its incipient motions, to keep the surface of the cornea in a moist, clean, bright state, fitted for the transmission of the rays of light, and lastly, to wash away any dust or other hurtful particles, which may accidentally fall upon, and irritate the organ. Mr. Pott, in his excellent account of this subject, has observed, that this fluid (meaning the tears) is derived principally from a large gland, named the lacrimal, situated under the upper edge of the orbit near the outer corner of the eye, which gland is of the conglomerate kind, and lies in a small depres.fion of the os frontis. Its excretory ducts, or thole by which it discharges the secreted fluid, pierce the tunics conjunctiva, just above the conjunctivous border of the upper eyelid.

When any irritative particles come in contact with the eye, a large quantity of fluid is immediately secreted by the lacrimal gland, and is as quickly diffused, by the motion of the eye-lids, over the surface of the eye; by which means, such particles are washed and wiped off. Sometimes, also, as Mr. Pott remarks, the passions of the mind produce an immediate increase of this secretion, which is then briskly called tears. A constant secretion of too large a quantity cures a disease, called epiphora (which few); and a deficiency of it makes the motions of the eye-lids difficult and painful.

Although the fluid, secreted by the lacrimal gland, is considerable in quantity; yet, when it is not suddenly produced by irritation from without, or passion within, it is so constantly and gradually carried off, as to create neither trouble, uneasiness, nor blennism.

The edge or border of each eye-lid, continues Mr. Pott, is fringed by a thin cartilage, the figure and consistence of which keep the lids properly expanded. These cartilages are covered by a fine membrane, and are called cilia. Their internal edges do, upon every motion, sweep over every point of the surface of the cornea. This motion, though almost imperceptible, unless attended to, is very frequently performed; and as the secretion of the fluid is also constant, the eye is by this means kept always moist, clean, and bright.

Mr. Pott next relates, that at the extremity of each of these cartilaginous borders of the eye-lids, on the side next the nose, is a small papilla or eminence; and in the middle of each there is a small hole, which, being situated in the cartilage, is not liable to collapse while the parts are in a sound state, but remains always open. They are called the puncta lacrymalis, and their office is to receive the lacrimal fluid, as it runs off the cornea, along the edges of the eye-lids, so as to prevent it from trickling down the cheek.

From each of the puncta lacrymalis proceeds a small membranous tube. These tubes soon enter, or rather expand into, a little fort of pouch, placed near the inner angle of the eye, under the orbicularis palpebrarum muscle. The bag in question is named the lacrimal sac, and its office is to receive all the lymph transmitted through the puncta and ducts. The upper part of the sac lies in an excavation, formed partly by the nasal process of the upper maxillary bone, and partly by the os nasus. The lower part of it is confined in a long channel, and forms a tube or duct, which, descending obliquely backward, communicates with the cavity of the nose, behind the os sphenoidum superior, by an opening of rather different sizes in different subjects.

This passage, says Mr. Pott, is called the ductus nasalis, and through it whatever is received by the lacrimal sac from
from the puncta does, in a healthy and sound state of these parts, pass into the nose.

The membrane which lines the lacrimal fac and nasal duct secretes a kind of mucus.

In the healthy state, the fluid secreted by the lacrimal gland readily passes off through the puncta, fac, and duct, into the nose; but when they are in a diseased state, the case is otherwise. The membrane lining the fac and duct is subjected to inflammation, by which it is often so thickened as to render the passage more or less impervious. Hence, the lacrimal fac becomes filled with its own mucus, and with the secretion transmitted into it from the eye; and when no more of this last fluid can enter the puncta lacrymalis, it falls over the eye-lid, down the cheek. The obstruction continuing, and the mucus and tears still lodging, the fac is dilated, and that tumour in the inner corner of the eye, and that discharge from the puncta lacrymalis, upon preffure, are occasioned, which characterizes the fistula of the fistula lacrymalis. See Pott's Observations on the Fistula Lacrymalis.

From what we have already stated, the reader must begin to suspect that the term fistula lacrymalis signifies no callous, indurated disease, accompanied with an acid, fuminous discharge; but merely a disorder, consisting of an obstruction in some part of those passages through which the tears have to pass into the nose, and attended with different appearances in different persons, and under different circumstances. Here the phrase "fistula" is sometimes, in consequence of ancient established usage, so improperly employed, that it is applied to a certain stage of the disease, new treated of, in which there is even no ulcerated opening at all, nor any other circumstance which, according to the dictates of common sense, could bring into the mind the idea of a fistula.

When the obstruction to the passage of the tears into the nose is only such as to occasion a watering of the eye, and a consequent necessity of wiping away the effused fluid, the disorder is commonly named epiphora; but when a fluid, somewhat similar to pus in appearance, accumulates in the lacrimal fac, and regurgitates through the puncta lacrymalis, on the fac being comprized, the complaint receives the name of fistula lacrymalis.

The eminent Scarpa, impressed with a conviction of the bad effects in practice resulting from the use of terms which convey erroneous notions, has proposed calling that stage of the disease which is attended with a discharge of a viscous, viscid, yellowish matter from the puncta lacrymalis, when the lacrimal fac is incompletely, the puriform discharge of the palpebrae. The term fistula lacrymalis is restricted, by this author, to that stage of the complaint in which the lacrimal fac is not only greatly dilated, but ulcerated, and in a fungous state on its internal surface; and in which there is also an external opening, occasionally attended with a caries of the os unguis.

The varieties of the disease commonly called fistula lacrymalis are referred, by Mr. Pott, to five principal circumstances, viz.

1. The degree of obstruction in the nasal duct.
2. The state of the cellular membrane covering the fac.
3. The state of the fac itself.
4. That of the base underneath.
5. The general state and habit of the patient.

Sometimes the lining of the fac and duct is so thickened, that the fluid cannot pass through it into the nose; and this forms the whole of the complaint. The cellular membrane on the outside not being diseased, there is no appearance of inflammation. In this case, as Mr. Pott describes, the duct is stopped, and the facculus dilated, but without any alteration in the colour of the skin. A fence appears in the corner of the eye next the nose; and upon the application of a finger to this tumour, a clear, viscid mucus is discharged through the puncta lacrymalis. The patient feels no pain, nor finds any inconvenience, except what is produced by the discharge of this mucus, and by the trickling of the tears down the cheek.

The same writer next adds, that, in some cases, the mucus is not perfectly clear, but is sometimes cloudy, and looks as if it had a mixture of milk or cream in it. At first, waking, some of it is generally found in the corner of the eye; and the eye-lids, being smeared over with it during sleep, most commonly adhere together in the morning.

Mr. Pott remarks that this is the most simple state of the disease, and what the French have called la beree, or hydrops facui lacrymalis. It is frequently met with in the children who have been rickety, or are subject to glandular obstructions; and, in this state, it sometimes remains for some years, subject to little altertions, as the health or habit of the patient vary. When the fac is not much dilated, the discharge small, and produced only by preffure, the chief inconvenience are the weeping eye, and the gumming together of the eye-lids after sleeping; but these, by being attended to, may be kept from being very troublesome; and, if the disease makes no further progress, may be so regulated as to render any more painful procésse totally unnecessary.

When the dilatation is considerable, says Pott, the swelling is more visible, and the quantity of mucus is greater. It is also in this state more frequently mixed and cloudy, and more troublesome, from the more frequent necessity of emptying the bag. But if the patient be adult, it may, even in this more dilated state of it, be kept from being very inconvenient.

If an inflammation comes on, the tumour is thereby considerably increased, the discharge is larger, as well during sleep as upon preffure; the skin covering it loses its natural whiteness and softness, becomes hard, and acquires an inflamed redness; and with the mucus a mixture of something which in colour resembles matter, is discharged, especially if the preffure be made with any force, or continued for any time. This circumstance, added to the painful swelling and inflamed appearance of the parts, has been productive of a supposition, that there is either an ulcer or an abscess within the fac or duct; an opinion which Mr. Pott has taken great pains to refute.

We shall here introduce Scarpa's sentiments concerning the manner in which the fluid which dilates the fac is formed. The viscous, viscid, yellowish fluid, mixed with tears, which regurgitates from the puncta lacrymalis, is not altogether secreted by the fac itself, as some have conjectured. The greatest part of it passes into the fac from the eye-lids, through the puncta lacrymalis, from which it regurgitates on preffure being made on the fac. This puriform fluid is chiefly secreted by the lining of the eye-lids, especially by the lower eyelid along the tarsus, and by the glands of Meibomius. The viscid matter, which is furnished by these glands, is not only secreted more abundantly, but assumes an irritating quality. Besides the viscid fluid from the glands just now specified, a thin mucus,
is effused from the lining of the eye-lids; which mucus greatly increases the quantity of viscid matter which is spread over the eye and eye-lids.

It becomes manifest that the puriform fluid, which comes out of the lacrimal fac, is derived from the sources which have been pointed out, by turning the eye-lids, particularly the lower one, outward, and comparing their appearance with that of the found ones of the opposite side of the face. The lining of the former always seems redder than natural, and exhibits a villous appearance, particularly along the tarsus. The margin of the eye-lid is swollen, and marked with a great number of little varicose vessels. The glands of Meibomius are more turbid and prominent than natural, and, when looked at with a magnifying glass, frequently seem to be somewhat ulcerated.

The villous texture, which the inside of the eye-lids acquires in these cases, is converted into an organ which secretes an unusual quantity of a fluid like visceral lymph, which, being blended with the febaceous secretion from the glands of Meibomius, makes the tenacious matter which is smeared over the eye-lids, and which, passing through the puncta lachrymalis, sometimes detains the lacrimal fac in a very extraordinary degree.

If the lacrimal fac be emptied of this matter by means of pre furious, and the eye and inside of the eye-lids be carefully washed, so that none of the glutinous secretion which issues from the fac may remain upon them, and the inside of the eye-lids be turned out half an hour afterwards, their inner surface, especially that of the lower one, will be observed to be covered with a new edition of mucus, mixed with a febaceous secretion; which fluids have manifestly not regurgitated from the lacrimal fac to the eye, but have been formed between the eye and eye-lids by the villous inside of the last-named parts, and the glands of Meibomius.

As a further proof, that the lacrimal fac has no other concern in this disease than that of receiving the tears and puriform fluid which are transmitted from the eye-lids, Scarpa mentions, that if the morbid secretion from the eye-lids be retarded or stopped, either by accident or the effect of applications, little or none of the viscid, curdy fluid accumulates in the lacrimal fac, or can be pressed out of the puncta lachrymalis.

The membrane which lines the lacrimal fac is one that has no sebaceous glands, and is only calculated for the secretion of a thin mucus. A small addition of this latter may be made to the puriform fluid and tears which are collected in the fac, but the quantity cannot be considerable.

We shall now reduce the account of the different states of the disorder, as delivered by Mr. Pott. The inflammation of the integuments covering the fac is a circumstance which makes a considerable difference, both in the appearance of the diseas and its requisite treatment. In some cases, it is confined merely to the surface of the tumour; in others, it spreads full farther, affecting the eye-lids, cheek, and side of the nose.

When the parts are in this state, continues Mr. Pott, the mucus within the bag has generally the appearance of being matter, that is, it wears a deep yellow colour, and is of a more thin consistence. If the puncta lachrymalis are naturally large and open, and the inflammation confined to the surface of the fac, its contents will pass off pretty freely, and the skin will remain entire. This is what the ancients called the simplex or imperfect ulceropy.

But, says Mr. Pott, when the skin covering the lacrimal bag has been for some time inflamed, or subject to frequently returning inflammations, it most commonly happens that the puncta lachrymalis are affected by it; and the fluid, not having an opportunity of passing off through them, detains the inflamed skin, so that at last it becomes floughy, and bulks externally. This was named the perforated ulceropy or ulceropy.

The discharge used to be made through the puncta lachrymalis, while the skin was entire, is now made through the new opening, and by excoriating the eye-lids and cheek, increases the inflammation, and gives the diseas a much more disgraceful appearance. In some, the matter bulks through a small hole, and, after it has discharged itself, the tumour subsides, the neighbouring parts become cool, and, though the skin covering the surface of the fac is floughy and foul, yet there is no reason to believe that the fac itself is much diffused below. In others, the breast is large, the skin remains hard and inflamed, and, from the appearance of the fore, there is reason to suppose the whole inside of the bag to be in a diseased state; and, in some cases which have been much neglected, or irritated by ill treatment, the cavity of the fac seems to be filled with a loose, ill-natured fungus, which glects largely, and produces inflammation and excoriation of all the parts about.

Mr. Pott observes, that there is another circumstance which is sometimes found to attend this disorder, viz. a curious flate of the bones. The practitioners, in ancient times, used to suppose this complication was a very frequent one; and hence they so freely had recourse to the caudical, cauterity, and scalping, in the treatment. But cases is now ascertained to attend the complaint but few.

When the fistula lachrymalis is a symptom of the lues venerum, as it sometimes is, the bones are indeed often curious; but then the fistula is not the original complaint, but produced secondarily, and is a consequence of the diseased state of the os ethmoides and ossa longitum of the nose, and is not curable by any local means or applications, but depends entirely on the cure of the diseas of which it is a symptom.

A very material difference, as Mr. Pott accurately explains, will be occasioned both in the appearance of the disorder, in the prognostic, and in the proper method of treatment, by the combination of other diseases, either of the constitution, the parts themselves, or adjoining ones. The patient, for example, is sometimes subject to an habitual ophthalmia or lippitudo, which will increase the deformity, and give a good deal of additional trouble during the cure. Mr. Pott also observes, that an ozum, or some other disease of the membrane and cells of the ethmoid bone, or a polypus within the nose, may be combined with a fistula lachrymalis. Strumous complaints are other frequent attendants; and, if we may believe Mr. Pott, it sometimes becomes cancerous.

We shall now proceed to speak of the treatment of the diseas; and, for the sake of rendering this subject as easily intelligible as possible, we shall imitate the above-mentioned writer, by dividing the disorder into four states.

The first consists of a simple dilatation of the fac, and an obstruction of the nasal duct, discharging upon pressure, a mucus either quite clear or a little cloudy.

In the second, the tumour is somewhat larger; the skin which covers it is in an inflamed state, but entire; and the discharge made through the puncta lachrymalis is of a pale yellow or purulent colour.

In the third, the skin covering the fac is become floughy, and bulks, by which means the fistula is in some measure filtered; but the mucus which, while the skin was entire, used to be pressed out through the puncta lachrymalis, now discharges itself through the new aperture. The nasal duct, both
both in this and the preceding flate, is not otherwise diseased
than by the thickening of its lining.

The fourth, the passage from the lachrymal fac into the
nofe is totally obliterated; the inside of the former being
either ulcerated or filled up with a fungus, and attended
sometimes with a caries of the bone underneath.

In the flirt or mull simple flate of the disease, viz. that
of mere obstruction, without inflammation, various plans
have been devised with a view of returning the parts to their
natural flate and ufe, without making any wound at all.
The chief of these methods have been the introduction of a
probe, the injection of a fluid, and a confluent compression,
made on the outside of the fac, in the corner of the eye.

A French surgeon, named Anel, invented a probe of fo
small a flize as to be capable of pacing through one of the
puncta lachrymalm, down into the nofe. As the instrument
was thus pushed through the lachrymal fac and nafal duct,
M. Anel conceived that it would be able to break any small
obftruction which might be met with.

The fame gentleman also invented a fyringe, furnifhed
with a very minute pipe, which admits of being introduced
into one of the puncta lachrymalm; and in this manner any
fluid may be injected into the fac and duct, in order to clear
away any thickened mucous or matter, which may be the
caufe of the tears not fianding their way, as they ought to
do, down into the nofe.

With regard to the introduction of a small probe through
one of the puncta lachrymalm, Mr. Pollock observes that the
plan has a very plausible appearance, but is unequal to the
talk affigned; the very small flize of the probe, its flexibility,
and the little resistance which it is capable of making, are
manifest deficiencies in the instrument. He allows that fuch
a probe may be paffed through one of the puncta down into
the nofe; but he contends, that the pain which it gives,
and the inflammation which it often excites, are much
greater than any benefit which does or can arise from it.

As for the idea, that this probe may be of ufe in removing
any obftruction in the puncta lachrymalm, it is an unfounded
one; for fhuch an obftruction is feldom met with at all, and
never can exit in this flate of the fiftula lachrymalm, one
principal symptom of which is a discharge into the inner
corner of the eye, when prefure is made on the fac. This
discharge is made from the fac, through the puncta, and
proves that the latter are open. The obftruction really
forming the fiftula is one that hinder any thing from paffing
from the fac into the nofe, and not from the eye into the
fac.

On the subjed of the fcrew, which Fabricius of Aquas-
pendente invented, for making prefure on the lachrymal
fac, we need only fay, now that it has gone into perpetual
difeafe, that though it anfwered the purpofe of compreffing
the fac very well, it did not operate in any way whatever on
the obftruction in the nafal duct, the primary caufe of the
difeafe.

M. Anel's fyringe is entitled to a much higher fhare of
recommendation than has been given to his probe. Indeed,
the plan of injecting fluids through one of the puncta lach-
rymalm into the lachrymal fac, for the purpofe of removing
any flight, recent obftruction in the nafal duct, is what re-
ceives the fummon of all the best furgeons and ocufilts of
the present day. It is evident, however, that it is a method
which can only be adopted while there is no ulcerated open-
ing in the fac, and only then, with much hope of success,
as long as the floppage in the nafal duct is flight, and fuch
as would be occafioned by the lodgment of thickened
mucus.

Before entering upon the defcription of the manner in
which the eminent Mr. Ware employs Anel's fyringe for
the cure of the epiphora, or first flate of the fiftula lachry-
malm, it is proper to acquaint the reader that, in the year
1780, Sir William Blizard made the propofal of injecting
quickfliver instead of water into the lachrymal fac, by means
of a pipe fmall enough to be introduced through one of the
puncta lachrymalm, and fixed on the end of a long glass
tube. In short, the instrument is exactly like what an
Anfelellian furgeon used to employ for the injection in the
lymphatics. The glass tube being filled with the mercury, as
high as the practitioner may deem necessary, and the little pipe in-
truded into one of the puncta lachrymalm, the quickfliver
deposited by its specific gravity into the lachrymal fac, as
soon as a little fcrew is turned, and, by reafon of its weight,
is, in Sir W. Blizard's opinion, more calculated than water
propelled from a fyringe for removing the obftruction in the
nafal duct. The force with which the mercury acts de-
pending entirely on its weight, it must be manifeflt that the
higher the column of the metal is made, the greater must be
the power with which it operates.

There cannot be a doubt that Sir William Blizard's
method is an exceedingly good one; but perhaps it has no
real advantage over the ufe of the fyringe, since the fluid
injected by this instrument is one which is always ready at
hand, and operates with as much power as mercury, when
the practitioner chooses to propel it with force into the
lachrymal fac.

Mr. Ware made a trial of Sir William Blizard's method,
but he at leafts preferred the employment of Anel's fyringe.
With this he usually injects warm water through the lower
punctum lachrymalm into the lachrymal fac, while a finger
is put over the lower punctum, in order to prevent the fluid
from making its way outward. The lachrymal should also
be now and then compressed, for the purpofe of promoting
the defcent of the water down into the nofe. In particular
instances, Mr. Ware has ufed the injection three times a
day; but, in general, much less frequently. This gentle-
man relates, that his practice has been attended with con-
siderable success.

Mr. Ware commonly commences his method of treat-
ment by injecting some water through the inferior punctum
lachrymalm, and he repeats the operation four or five days
in fuccefsion. If, in this space of time, none of the water
should pafs through the duct into the nofe, and the watering
of the eye be as troublesome as it was before the injection
was employed, he commonly orders the angular vein to be
opened, or a leech to be applied near the lachrymal fac. How-
ever, Mr. Ware is careful in forbidding the leech to be put
on either of the eye-lids, lest it should occasion an extra-
vation of blood in the adjacent cellular membrane.

About the time when blood is taken away from the vic-
inity of the eye, Mr. Ware is in the habit of changing the
injection, and trying the effects of a weak, vitriolic, or
anodyne lotion. In fome instances also, when, after se-
veral attempts, he has not been able to inject any part of
the liquid through the duct, he has introduced a golden probe,
about as large as a briflle, through the superior punctum
lachrymalm, and, attending to the direcHon of the duct, he
has infinuated the end of the instrument through the obftruc-
tion, and conveyed it fully into the nofe. Immediately after
this, Mr. Ware has found, that a liquid, injected
through the inferior punctum, has passed without any diffi-
culty into the nofe; and, by repeating these operations a
few successive days, the perversus flate of the paffage has
been re-established, and a cure accomplished.

On some other occasions, Mr. Ware has advised a strong-
ly fimalating fcrumentory to be nuflled up the nofe, about
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an hour before bed-time. Thus a large discharge has been
existed from the Schneidierian membrane, which discharge,
according to Mr. Ware's account, has had the effect of
materially contributing to remove the stropage in the nasal
duct.

Very few cases present themselves which are not reme-
diable by some of the above means. In certain examples
which have been attended with a factitious discharge, Mr. Ware
has corrected this bad quality, by injecting a vitriolic lotion
into the lachrymal sac.

The celebrated Scarpa of Pavia, who has lately pub-
lished some excellent observations on the diseases of the eye,
has set forth the doctrine, that the primary and proved
case of the lachrymalitis does not exist either in the
lachrymal sac or the nasal duct, as surgeons have hitherto
supposed, but in the morbid state of the eye-lids. Hence
the same writer contends, that every method of treatment
which is merely calculated to heal the ulceration of the sac,
or remove the obstruction in the nasal duct, cannot accor-
dingly a permanent cure of the disease, without the employment
of such other remedies as are proper for correcting the dif-
fected secretion from the eye-lids.

In the first stage of the fistula lachrymalis, called by Scar-
pa " il flullo palpebrale puriforme," this surgeon's practice
confists in fulfilling two indications: viz. first, that of check-
ing the secretion from the lining of the eye-lids, and the
ducts of Mollusca, from which disced fluid he thinks
that the fistula lachrymalis originates; secondly, that of
diligently washing out the lachrymal passages throughout
their whole extent.

For the first object, Scarpa recommends the use of Jania's
ophthalmic ointment, which is composed of half an ounce
of hog's lard, two drams of prepared titty, the same
quantity of Armenian balsam, and one dram of the calx
hydrgyri alba. The lard, after being washed three times
with rofe water, is to be well mixed with the other ingre-
dients, after they have been made into a fine powder.

When this ointment is first used, it is to be rendered weaker
by the addition of a larger proportion of lard than what is
above-mentioned. A bit of the ointment, about the size of
a barley-corn, is to be put on the end of a blunt probe,
and applied between the eye-lids and eye-ball, near the ex-
ternal angle, every morning and evening, and all the edges
of the palpebrae are also to be smeared with the same appli-
cation. The patient is then to rub his eye, and gently rub
his eye-lids, in order to diffuse the ointment all over their
internal surface. A compress and bandage are next to be applied.
At the end of two hours the eye may be unco-
 vered, and washed with cold water. A collyrium of zinc
vitrulatum, and mucilage of quince seeds, is also to be used
three or four times a day.

When there are small excoriation upon the edges of the
eye-lids, Scarpa recommends the ungumentum hydrgyri nit-
trati to be applied at bed-time to the little fores. When
this remedy fails, he says the argentum nitrum must be
gently rubbed along the margin of the eye-lids, and the eye
immediately afterwards washed with new milk.

Just before every time of making these applications to the
eye-lids, Scarpa, in order to fulfill the second indication
above specified, advices some plantain-water, containing a
little spirit of wine, to be injected into one of the puncta
lachrymalis, by means of Auel's syringe.

With regard to the truth of the theory advanced by
Scarpa, concerning the primary cause of the fistula
lachrymalis, we cannot help having our doubts; but of the
practice which we have been describing, we have
to express our entire approbation. If the origin of the
disease always depended on the morbid secretion from the
lining of the eye-lids and the glands of Mollusca, why do
we not have a fistula lachrymalis as an attendant on nu-
merous ophthalmias in which we know and feel that such se-
cretion is in a diseased state? Besides, in the practice of
surgery, we have most positive evidence that the ductus na-
fals very frequently becomes obstructed by the pressure of
polypi and other tumours in its vicinity; and although
this cause cannot be assigned as the ordinary one of the
disease, yet it proves that a fistula lachrymalis may sometimes
originate without the secretion of the eye-lids being con-
cerned in its production. Experience also shews,
that colds which inflame and thicken the Schneidierian membranes,
sometimes bring on obstructions in the nasal duct. Nor is
the statement of Scarpa altogether correct, when he ob-
erves that the disease can never be permanently cured by re-
medies which only operate in clearing away the obstruction
in the duct, without acting upon the diseased inner surface
of the eye-lids. We have daily proofs that the epithora,
the incipient state of the fistula lachrymalis, or, as Scarpa
terms it, the palpebral puriform discharge, can be cured by
merely injecting warm water, with Auel's syringe, through
the lower punctum lachrymalis.

The ample experience of Mr. Ware is a confirmation of
what we have just now remarked.

Much, however, as we have differed from Scarpa in rela-
tion to the primary causes of the fistula lachrymalis, we
entertain the most favourable opinion of that part of his
practice which arises out of his theory. We allude to the
plan of applying some such ointment as Jania's, or the un-
geualtum hydrgyri nitrat, to the edges and inside of the
eye-lids. Scarpa's description of the diseased state in which
the inner surface of these parts is found, is perfectly ac-
curate, and whether such state be regarded with him as a
cause, or with us only as an effect, there can be no doubt
that something should be done to rectify it.

We have now to speak of the treatment of the second and
third stages of the fistula lachrymalis, or of those in which
the skin covering the lachrymal sac is either inflamed or
burst.

This part of surgery has only attained its present improved
state within a few years; and Mr. Pott, who wrote so well
on every surgical subject which attracted his notice, has
recommended in his works a mode of treating these states
of the fistula lachrymalis much less simple and efficacious
than what modern surgeons now universally prefer. For infla-
ence, when the face is burst, he directs the opening, if neces-
sary, to be enlarged with a knife, and, in other cases, an incision
to be made through the skin into that cavity. He then ad-
vises us to dissuss the wound moderately with dry lint, or
prepared sponge, so as to be able, in two or three days,
to ascertain the state of the inside of the face, and of the ductus
nasalis. When the former is not flougy nor diseased, and
the obstruction in the latter flight, a cure will sometimes es-
ue, according to Mr. Pott, on a free discharge taking place,
and superficial dressings being applied to the fore.

When this method is not attended with success, Pott
advises us to render the nasal duct pervious, by introducing
a probe, a piece of catgut, or a bougie, from the wound
down into the nose. When one of these incisions will not
pass all the way down at once, it is to be gently introduced
again and again until a pallage is obtained.

About the year 1786, Mr. Withen tried the effect of in-
roducing a cannula into the nasal duct. His object was
not only to form a communication between the eye and the
nose, but, by letting the wound heal over the instrument
without the obstruction from returning afterwards. In

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this way many cures were effected; but, after a time, the method was found to be subject to difficulties. The tubes, as Mr. Ware relates, frequently changed their position in the duct; sometimes they rose too high; at other times they sunk too low; and, in consequence of these accidents, the tears often became obstructed again, and all the old symptoms returned.

A French oculist, M. Pellier, invented some canules, which had two projecting edges; one at the top forming a kind of brim, and another about the middle of the instrument. The intention of these was to keep the tube from ascending or descending, after granulations had occupied the space between the two projecting brims.

Notwithstanding the favourable accounts which have been given of canules for the cure of the fistula lachrymalis, Mr. Ware has experienced much disappointment from their use: and, among the objections to them, mentions the difficulty which sometimes attends the attempt to withdraw them from the duct, in which they have become fixed.

For the second and third stages of the fistula lachrymalis, the treatment which now obtains universal preference is that which Mr. Ware introduced into practice. Whenever a patient applies to this gentleman for relief, on account of an obstruction in the nasal duct, be always thinks it right to endeavour to free the canal from any thickened mucous which may be lodged there, by injecting some warm water through the lower punctum lachrymale. At the same time he tries, when necessary, the effect of other remedies, mentioned in his writings, upon the eye-lid. But if no benefit be perceptible after employing these means about a week or ten days; or, from the long continuance of the obstruction, such treatment cannot be expected to succeed; he recommends the operation which we are about to describe. However, with respect to children, Mr. Ware advises it to be deferred till they are eight or nine years old.

If the disease has not occasioned any external opening in the lachrymal sac, or if there is an opening which is not situated in a right line with the longitudinal direction of the nasal duct, Mr. Ware advises a puncture to be made into the sac, at a small distance from the internal commissure of the eye-lids, and nearly in a line drawn horizontally from this commissure towards the nose. This opening is to be made with a very narrow sharp-pointed lancet. The blunt end of a silver probe, which must be rather smaller than the probes commonly used by surgeons, ought next to be introduced into the wound, and be gently, but steadily, pushed on in the direction of the nasal duct, with a force sufficient to overcome the obstruction in this canal, and until there is reason to believe that it has freely entered into the cavity of the nose. Mr. Ware remarks that the position of the probe, when thus introduced, will be nearly perpendicular; its side will touch the upper edge of the orbit; and the space between its bulbous end in the nose and the wound in the skin will usually be found in a full grown person to be about an inch and a quarter, or an inch and three-eighths. The probe is then to be withdrawn, and a silver flyle, of a size nearly similar to that of the probe, but rather smaller, about an inch and three-eighths in length, with a flat head, like that of a nail, but placed obliquely, in order that it may be close on the skin, is to be introduced through the duct in place of the probe, and to be left, for a continuance, in this situation. For the first day or two after the flyle has been introduced, Mr. Ware informs us that it is sometimes advisable to wash the eye with a weak farraine lotion, for the purpose of obviating any tendency to inflammation, which may have been excited by the operation. However, the same gentleman observes that this inflammation is in general to flight, that he has seldom found it necessary to use any application for its removal. The flyle should be withdrawn once every day for about a week; and afterwards every second or third day. Each time some warm water should be injected through the duct into the nose, and the instrument be then replaced in the same manner as before. Mr. Ware next blackens the head of the flyle with sealing wax.

On the first trials of this method, Mr. Ware entertained no expectation that any relief would be obtained till the use of the flyle was left off. He had the gratification of finding, however, that the watering of the eye ceased as soon as the flyle was introduced, and the sight became proportionally better and stronger.

In cases in which there is no external opening in the lachrymal sac, or no opening which will answer the purpose, Mr. Ware only makes a puncture of just sufficient size to admit the end of the probe or flyle. This aperture soon changes into a fistulous orifice, through which the flyle may be passed without the least pain. In short, says Mr. Ware, in about a week or ten days, the treatment becomes so easy, that the patient, or any friend, is fully competent to do what is necessary. It merely consists in withdrawing the flyle two or three times a week, occasionally injecting some warm water, and then replacing the instrument in the same position which it held before.

With respect to the time which the flyle should be worn, no determinate rule can be laid down. Mr. Ware acquaints us that some persons, who find no inconvenience from the flyle, and are afraid to leave it off, wear it for years. Many others leave it off in about a month or six weeks, and continue quite well.

The forces which are frequently met with over the lachrymal sac generally heal as soon as the tears begin to find a passage down into the nose. Two examples, however, are related by Mr. Ware, in which the ulcerations did not heal until the patient had taken a weak solution of the hydrargyrum nitrate and bark.

The fourth and last stage into which the fistula lachrymalis is divided, is that in which the natural passage from the sac into the nose is so diseased as to be quite obliterated, or in which bones are carious.

In either of these circumstances the object to be attempted is to form an artificial passage for the descent of the tears into the nose.

Mr. Pott has explained, in a very clear manner, that the upper and hinder part of the lachrymal sac is firmly attached to the os unguis, a small and very thin bone just within the orbit of the eye. This bone is so situated, that if it be by any means broken through or removed, the two cavities of the nose and of the orbit communicate with each other; consequently, the os unguis forms the partition between the hinder part of the lachrymal bag, and the upper part of the cavity of the nose. It is, says Mr. Pott, by making a breach in this partition, that we attempt the formation of an artificial passage for the lachrymal fluid.

For making a perforation in the os unguis Mr. Pott always employed a curved trocar, the point of which was turned obliquely downward from the angle of the eye towards the infide of the nose. Some make the breach in the bone with a knife; others with some such instrument as a gimblet. As soon as the communication between the sac and infide of the nose is made, the circumstance will be indicated by a discharge of blood from the nostril, and air from the wound, upon blowing the nose.

Without lengthening this article by detailing how the ancients
ancients used to make the breach in the os unguis with the actual cautery, which the celebrated Scarpa even now prefers, or by explaining how practitioners a very few years back were wont to maintain the breach open by cramming in tents, prepared sponge, a piece of bougie, &c. we shall proceed at once to describe what is generally regarded as the best plan of keeping the artificial opening pervious.

Here we have to make the reader acquainted with an improved mode of treatment, for which the public and the profession are indebted to the ingenuity of Mr. Ware. After the perforating instrument is withdrawn, this gentleman advises us to introduce a nail-headed fylle, about an inch in length, through the new aperture, in the same manner in which such an instrument is passed through the nasal duct, in cases in which the obstruction is not so great as to prevent its passing in this direction. The fylle may also be left in the opening made in the os unguis, with as much safety as in the natural ductus nasalis, and this for as long a time as may be deemed requisite for removing all chance of the new passage becoming closed again. Pott on the Fistula Lachrymalis. Ware on the Epiphora and Fistula Lachrymalis. Scarpa tulle Principali Malattie degli Occhi. Venezia, 1802.

FISTULA in Perinizo.—Very often, in consequence of various irritations affecting the urethra, inflammations and abscesses are occasioned around this canal. These collections of matter may burst inwardly into the urethra, or externally, or in both ways, in which latter case more or less of the urine flows out of the opening, whenever the patient has need of discharging this fluid. Sometimes the artificial passage through which the urine is evacuated heals up, after the irritation in the urethra is softened. In other instances, the cause of the preternatural opening remains unremoved, and the urine passing into the abscess by the inner orifice, and, making its escape by the external one, keeps up a constant irritation in the fore, prevents the fides of the passage from uniting, and converts them into a hard callous substance, the inner surface of which, as Mr. Hunter has remarked, loses the disposition to union, and assumes the nature of an outlet. Every opening which is thus caused, which partakes of this nature, and is flitted in the perineum, or even in the periculum, is, with the general consent of surgeons, denominated a fistula in perinizo.

The kind of irritation in the urethra most frequently occasioning fistula in perinizo, is that which attends the obstruction produced by fustures in this canal. When this latter disease is very bad, and the urethra considerably obstructed, nature frequently endeavours to procure relief by ulceration on the inside of that part of the urethra which is between the bladder and the fylure. The urine then passes into the loofe cellular membrane of the cerumen and penis, and the irritating quality of this fluid becomes a cause of suppuration wherever it is extravasated, and even of mortification, first, of all the cellular substance, and then, of several portions of the skin. If the patient continues to live, all these flouglis are detached, and the fones contract, till nothing but the fibrous aperture remains, through which the urine makes its escape. In some examples the urine infiluates itself into the corpora spongiosa urethrae, is diffused all over this substance, even into the glans penis, and produces a flouging of all the parts in which it is lodged.

In irritable constitutions, in old persons, and in subjects whose systems have long been under the influence of the East or West India climate, fistula in perinizo seem to be more easily excited. We have often seen, in such patients, abscesses and openings, through which the urine flowed, occasioned by gonorrheas, which could not be regarded as severe ones, and by fustures which had not made sufficient obstruction in the passage even to render the persons themselves conscious of having any stoppage of this kind at all.

Mr. Hunter advises us to treat inflammations which occur in the vicinity of the urethra in the same manner as inflammations in other parts. Resolution is very desirable, though hardly to be expected, when a fylure is the cause, in which case suppuration almost inevitably ensues. When matter is formed, the sooner an external opening is made into the abscess the better, as by this means we may sometimes, though not often, prevent it from bursting inwardly into the urethra. Mr. Hunter recommends the external opening to be made large.

In certain instances it happens, when the collection of matter bursts internally, that the fylure is removed by the ulceration, and is thus fortunately cured. But when the fylure continues, as it almost always does, an attempt must be made to destroy it by some of the methods which will be described in a subsequent part of the Cyclopaedia. (See Stricture.) While the urine passes through the artificial passage no cure can be hoped for.

From what has been already delivered, it must be obvious, that in every instance in which a fylure is known or suspected to have occasioned the abscesses and fistula in perinizo, it is proper to examine the urethra with a bougie. If the obstruction has been more or less destroyed by ulceration, so that this instrument, of a certain size, can be passed, its employment should be almost incessantly continued, and its fize regularly increased as fall as circumstances will allow, in order to procure a free passage onward to the bladder. Some practitioners, in the same kind of case, would prefer the use of bougies armed with cautic; but this subject more properly belongs to the article in which fystures will be considered.

Some practitioners recommend hollow bougies to be used after the fylure is in part removed, with a view of preventing the urine from passing into the artificial opening. Mr. Hunter remarks, that this instrument allows the urine to dribble away continually; but that its orifice may be stopped up, and the urine only allowed to flow when the patient has an inclination to make the evacuation. The hollow bougie, according to the same great surgeon, becomes, under certain circumstances, the worst instrument possible; for if its canal is not of a size sufficient to let the water pass as freely as the contraction of the bladder requires, the fluid will easily pass by the side of the bougie, and not being able to get more forward than the remaining part of the fisture, will of course run into the abscess in the perineum. In order to avoid this disagreeable occurrence, as much as possible, the hollow bougies should be as large as the fyluted part will allow, and their fides should be as thin as possible, so that their cavity may be the wider. On these accounts the elastic gum catheters ought to be preferred to common hollow bougies, made with spiral wire, covered with waxed cloth.

Mr. Hunter himself entertained doubts whether the abscesses in the perineum was really prevented from healing by the passage of the urine through it, and, consequently, had very high opinion of the use of hollow bougies. He observed, that after lithotomy the parts healed very readily, when they were free from fisture. Hence he suspected that abscesses and fones in the perineum, the want of dispositions to heal arose from the fisture not being taken care of, or the deeper parts not being in a healthy state.

When suppurations in the perineum are neglected, and no attempt is made to cure the fylure, the latter forms those oles entirely, no bougie can be passed through it, and all the
the urine passes through the artificial passage. For such
incisions calibre bougies are such as ought to be employed.
In cases in which suppuration takes place in the peri-
num, in consequence of stricutures in the urethra, the sur-
geon should not limit his attention to the removal of the
latter affection only; he should also make use of every means
which is proper for diminishing the local inflammation.
Bleeding, and exposing the parts to the stream of hot water,
are measures fraught with peculiar efficacy. All prac-
titioners likewise acknowledge the great benefit which is
derived from the use of opium, administered both by the
mouth and in glycers. Irritation and spasm will be most
effectively relieved by confining with the foregoing treat-
ment the employment of the warm bath.
In some examples matter forms in the perineum, and
builds both internally and externally, so that a passage
is made, through which the urine escapes; but in consequence
of the abscess being circumcised by the adhesive inflam-
mation, which fluxes up the cavities of the cellular sub-
stance, the urine does not become diffused.
The avoidance of such an extravasation, however, is fre-
quently not in the power of the surgeon; an unfortunate
truth, because sloughing and abscesses generally arise in
every place into which the irritating fluid infiltrates itself.
As the mischief continues to increase as long as the urine
cannot find a free vent outward, and is, consequently, in-
jected more and more into the cellular membrane, the prac-
titioner must not be guilty of delay. It very often happens
that all the methods related above prove insufficient, or un-
productive of the prompt relief which is urgently demanded.
In this circumstance the surgeon must try by other means
to unload the bladder, and prevent the increasing extravas-
ation in the cellular membrane of the perineum, femur,
and adjacent parts. These two great definable objects may be
effectually disposed of by making an opening into the urethra, somewhere
beyond the stricture; though the nearer to it the better.
With this view, Mr. Hunter advises a director or stict to be
introduced into the urethra, as far as the stricture, and
an incision made down upon the end of the instrument. The
cut is then to be lengthened a little towards the anus, so as
to open the urethra just beyond the obstruction.
In cases in which the stricture happens to be situated op-
posite the femur, we are recommended by Mr. Hunter to
make an opening into the urethra in the perineum. It is
obvious that in such incisions we cannot have the stict to
hold us, and we must be directed by our knowledge of
anatomy. A cannula is then to be passed from the wound to
the stricture, and another cannula from the glans penis
also to the obstruction, so as to meet the other tube. A
perforating instrument is then to be pushed from one can-
nula into the other, by which means the stricture will be pe-
netrated.

The next step is to withdraw the two tubes, and
introduce a gum-catheter, which is to be worn till the wound is
healed.

These proceedings, however, are only to be considered
as proper in certain very urgent cases. In others, the in-
creasing diffusion of urine may be stopped by merely making
an opening into the urethra, somewhere between the stric-
ture and bladder; and, indeed, in the generality of in-
cidences, a diligent use of bougies, and making depending
apertures for the discharge of the urine, which becomes
extravasated, will remove all occasion for more severe mea-
ures.

Nor should the important considerations which we have
already stated be overlooked in the practitioner’s at-
tention. Other matters also require his care. That inflam-
mation, which is constantly excited wherever the urine is
extravasated, should be diminished as much as possible.
Fomentations and poultices should be applied, and the same
incisions and incisions which serve to let out the urine,
and prevent its spreading further in the cellular substance,
will also serve to give vent to whatever pus may be collected.
When there are sloughs, which is too frequently the case,
the incisions should of course rather be made in the infec-
tious dead parts than in the living ones. However, the
advantage of having a depending opening ought even to be
paramount in the surgeon’s mind, to the falsely humane
relief of not subjecting the patient to pain. By submitting
to requisite operations, it is true the latter suffers for a time,
but it is equally obvious that he would certainly suffer
much more, and perhaps ultimately die, were such opera-
tions neglected. It is frequently the case in surgery, that
these proceedings which to an unthinking person seem
to be so bold, bloody, and cruel, are in reality, with regard to
what the patients must feel, the most tender and humane,
and, with regard to his safety, the most direct. Were
the surgeon’s knife not used when diseases require it, the
patient certainly would not feel the sharp edge of the
inflammatory; but he could not in this way clade pain, which
would be tenfold greater, when resulting from the increas-
ing ravages of the disease, than when inflicted by the surgeon,
with this material difference, that in one instance it is suf-
fering for the chance of a recovery; in the other, it is suf-
ferring in all probability to die.

In cases of old fistula in perineum, in which the dangers aris-
ing from an extravasation of urine are over, either common or
armed bougies are to be used for the purpose of making the
urethra as free from obstruction as possible. When the stric-
tures give way, and the urine can flow freely forward, the
fistulous openings in the perineum often spontaneously
heal.

When the urethra is completely free from stricutures, and
yet the fistula in perineum do not heal, the fistulas are to be
laid open like all others which have no disposition to get
well. One great object in performing such operations is to
cut as little as possible of the sound urethra. On this ac-
count, Mr. Hunter advises us to find the inner orifice of the
fistula, if possible, by introducing a stict, which is to meet
the end of a probe pitted through the fistula into the
urethra. Surgeons ought to understand, that though fistula
in perineum often have several external openings, they seldom
or never have more than one internally, with which they com-
unicate with the urethra. A director is the most con-
venient instrument when the straight course of the fistula
will allow it to be introduced. When the fistulous passage is
tortuous, a probe is best, because it can be bent into any
shape.

The probe or director being introduced so as to meet the
stict, the surgeon is carefully to lay open the fistulas, through
which it pales, and he is to do this till he has cut as far as the
stict.

When no probe nor director can be made to enter so far
to touch the stricture, the surgeon must lay open as much of the
fistula as the instrument enters, and then endeavour
to find the continuation of the fistula.

As soon as the fistulous fistulas are all laid open down to
their termination in the urethra, a gum catheter should be
introduced, and worn at first almost without intermission.
However Mr. Hunter recommends the catheter to be
slid, as soon as the fores become stationary, as it some-
times has the effect of preventing them from healing.

The same eminent surgeon also advises us to dree the
wounds at first down to the bottom. If this prudent method
were neglected, the superficial parts might close, while the
deeper
deepers ones remained unhealed, and fresh abscesses and fistulas be the consequence.

**Fistula, Salivary.** See Salivary Fistula.

**Fistula Palatini.** In Anatomy, a term used by some writers for the *alvea arteria.

**Fistula Sacra.** is that part of the back-bone which is perforated.

**Fistula Urinaria.** the name of the urethra.

**Fistular, or Fistulous.** is applied by the surgeons to wounds and ulcers which degenerate into fistulas.

**Fistulae.** is also applied to the leaves of plants which are round and hollow within; as the leaves of leeks, &c.

**Fistular Flowers, among Herbalists.** are those made up of many small, long, hollow flowers, like pipes.

**Fistularia.** in Ichthyology, a genus of abdominal fishes, the finout of which is cylindrical; jaws distant from the eyes; gill-membrane with seven rays; body round, and gradually tapering from the jaws to the tail.

**Species.**

**Tabacaria.** Tail blind, and ending in a ferocious proc. Linn. *Tabanula, Marcq. Tobacco-pipe fish. Will.*

A very singular species, found in the seas of America and Japan. The usual length of this fish appears to be from twelve to eighteen inches, exclusive of the bright-form processes which proceeds from the extremity of the body between the two lobes of the caudal fin, and in general measures rather more than one-fourth of the length of the body. Some writers, however, assure us that the tobacco-pipe fish grows to the length even of three or four feet.

The shape is that of an eel, the skin smooth, of a livid brown colour above, and silvery beneath; the back and sides are marked with longitudinally series of blue spots, disposed on each side the middle of the back in two distinct lines; the lateral line is straight, and the fins pale red. In some examples of this fish the tail exhibits two of the above-mentioned filament appendages instead of one; whether his ought to be considered as an accidental circumstance, or as a criterion of sexual difference is uncertain; Dr. Blyth observes that the finout of these with two appendages to the tail is fertilised. According to the remarks of Count de Cepède the finout of this fish is very peculiar in structure, the fifth vertebrae being of immoderate length, the three next much shorter, and the rest gradually decreasing as they approach the tail. The species inhabits on smaller fishes, marine infests or worms, &c, which the structure of its finout enables it to obtain, by introducing that part into the cavities of the rocks.

**Chinensis.** Tail rounded, and without the long appendage. Linn. *Chinensis trumpet fish.*

A native of the Indian seas, and Possesses the fame habits as the former. Its general shape resembles that of the common eel. The head is elongated, somewhat bony, and compressed; the front tubular and rather broad; mouth small; eyes rather large; and the body covered with scales of moderate size. The prevailing colour is reddish-brown, of a pale hue, with three or four whitish stripes extending from the gills to the tail; the upper part of the body variegated with dusky spots, and the fins pale yellow.


A species apparently described in the first instance by Seba, and since with yet greater accuracy by Pallas. This fish is of the smaller kind, being only from two or three inches in length, or four inches at the utmost. The body is whitish-ah; with obsolete brown rivulets; the first dorsal fin and tail blackish; compressed, and spiny at the interjection of the lines. The head is rather small; eyes large, at the base of the snout, and with a triangular spine on each side before the orbit. The snout is remarkably long, straight, horny, and terminated in a mouth of small dimensions. The tip is armed with three spines; the gill-openings are shallow, small, and divided with a few prominent lines. The first dorsal fin is long, retracted, and banded with black; the pectoral fins are very broad; the ventral remarkably large, with the rays deeply and divided, and connected by means of a fleshy membrane in the form of a longitudinal pouch.

**Fistulator, Lat. a pipe.**

**Fistulosus Uccer.** See Fistula.

**FIT, in Medicine, an access, exacerbation, or paroxysm of disease.** The term is applied particularly to intermittent or periodical diseases; as we pay an ague-fit, the cold or hot fit of the same complaint; and also to all sudden or violent disturbances of the system, as to the attack of apoplexy, epilepsy, hysteria, &c. The word fits, when used without any epithet, applies principally to hysterical attacks in women, to the convulsions of children, and, among the vulgar, to epilepsy. See Convulsions, Epilepsy, and Hysteria; also Cold Fit.

**Fits of easy reflection and easy transmission.** See Light.

**Fits of the mother.** See Hysteric affection.

**Fitaque, or Floquii, in Geography, a town of Japan; 35 miles E. of Jeddo.**

**Fitchburg, a town-of America, in Worcester county, Massachusetts; 25 miles N. of Worcester. It contains 1500 inhabitants.**

**Fitchic, or Feach, in Heraldry, is when the lower part of any cross is sharpened into a point fit to fix into the ground. Thus, he bears azure, a cross-potent fitche.**

The origin hereof McKenzie ascribes to the primitive Christians, who used to carry their crosses with them wherever they went; and when they stopped at any place in a journey, fixed them in the ground.

**Fitches, in Agriculture, a common name often applied by farmers to vetches.** Crops of this sort are grown in the field both as a green food for live-stock, and their produce in feed. They are mostly sown broadcast over the land, and harrowed in by a light harrow; but occasionally in drills at narrow distances.

The feasons for putting the crops into the ground are either the autumn or spring, according as they are wanted.

They are occasionally likewise cultivated as a green crop, for being turned into the field as a manure. This is usually done just before they come into full bloom, when they are in their most luxuriant state. See Mansel.

When used green for toting cattle, they are an excellent food; and when given in the pod extremely fattening. See Tares and Vetches.

**Fitchet, a name used in some places for the weasel; called also the flickel and the ficitel. See Vivera Putoria.**

**Fitsil Head, in Geography, a cape of Scotland, on the W. coast and S. extremity of Mainland, one of the Shetland islands. N. lat. 59° 50'; W. long. 14°.**

**Fitting-out, in Naval Language, the act of providing a ship with a sufficient number of men to navigate and
FIT and arm her for attack or defence; as also of furnishing her with proper masts, sails, yards, ammunition, artillery, cordage, anchors, and other naval furniture, together with sufficient provisions for the ship's company. See Crew.

FITTRE'S, or FIDERI, in Geography, a country of Africa, otherwise called Lusit, and Cougu or Cougu, situated on the borders of a large lake to the south of Begarme. It is governed by a sultan, and his dominions have been much diminished by the encroachments of the sultans of Begarme and Wadye. The inhabitants live in small tents, and are said to be in a low degree of civilization. They have no salt, except what they procure from the ashes of gollib. The lake is situated 210 miles S. of Bordon, N. lat. 15° 56'. E. long. 22° 30'.

FITZ, a French term, literally denoting fan; sometimes given by way of addition to the natural fans of the kings of England; as James Fitz-Roy, duke of Grafton, &c. FITZHERBERT, Sir Anthony, in Biography, a learned lawyer and judge, who obtained the distinguished Henry VIII. was the younger son of Ralph Fitzherbert, esq. of Norbury, in the county of Derby. He was educated at Oxford, and pursued his studies, as preparatory to the practice at the bar, in one of the inns of court in the metropolis. He attained the degree of sergeant at law in 1511, and received the honour of knighthood about the same time. In 1523 he was appointed one of the justices of the court of Common Pleas, in which office he passed the remainder of his life, and was distinguished by many valuable legal works, as well as by such an honourable discharge of the duties of his office, as made him entitled to an oracle of the law. In the discharge of his duty he feared no man, and opposed the arbitrary proceedings of Wolsey in the height of his power. On his death-bed he is said to have exacted a promise from his children that they would neither accept grants, nor make purchases of lands of the dissolved religious foundations, to which they commonly adhered. He died in the year 1530, leaving a numerous posterity. His principal writings are, "The grand Abrége," a collection of cases abridged; "The office and authority of Justices of Peace," "The office of Sheriffs, Bailiffs of Liberties, Constables, &c." and "The new Natura Juris." He is supposed to have been the author of a work entitled "Of the surveying of Lands," and also of "The book of Husbandry." Biog. Brit.

FITZHERBERT, Thomas, grandson of Sir Anthony, was born in the county of Stafford in the year 1552, where he received the early parts of his education, after which he went to Oxford to pursue his studies. On account of his rigid adherence to the Catholic principles, in which he had been brought up, he exposed himself to occasional reproofs from his superiors, and at length became an object of persecution, and was committed to prison in the year 1572. Harsh measures rarely make a man less tenacious of his principles; and, upon his liberation, he became more active in promulgating the doctrines of popery than he had ever been, till at length he was obliged to seek safety in concealment. In the year 1580 he connected himself closely with some Jesuits sent into England as missionaries, afflicting them as far as he was able with money and advice. By this conduct he incurred the penalties of "pernunnire," and, alarmed at the risks he was every day running, he went to France. This was in the year 1584; he interested himself very much in behalf of Mary queen of Scots; and when the death of that unfortunate princess rendered his exertions no longer of any avail, he went to Madrid to implement the protection of Philip II. in behalf of the catholics, and their religion in England. From Madrid he went to Rome, took a lodging near the English college, and observed the same devotion as the inmates of that house, and spent the remainder of his time in writing books in defence of the catholic religion. In 1614 he became a member of the Society of Jesus, was admitted to priest's orders, and almost immediately afterwards removed to Flanders, to preside over the English mission there. Here he displayed great learning and talent, and acquired so much esteem by his behavior and conciliating manners, that he was invited to accept the rectorship of the English college at Rome, the duties of which he discharged with high reputation for twenty-two years. He died at Rome in the year 1640, at the very advanced age of eighty-eight. As an author his works are numerous, but being chiefly on controverted points of religion, they have little claim to notice. Biog. Brit.

FITZHUGH'S Sound, a narrow channel of the N. Pacific ocean, between Calvert's island, and the W. coast of North America.

FITZJAMES, James, in Biography, duke of Berwick, natural son of king James II. by Arabella, sister to the great duke of Marlborough, was born in 1657 at Moulins, in France, where his mother was, in her return from the battles of Bourbon. He was educated for the military profession, and distinguished himself at an early age at the siege of Buda and battle of Mohatz in 1686 and 1687. On his return his father conferred upon him the title of duke of Berwick, &c. with the order of the garter. At the revolution he accompanied the abdicated king to France, and afterwards went over to Ireland to command in the absence of Lord Tyrconnel. He fulfilled important commands at the siege of Londonderry and the battle of the Boyne, and when all was lost in that country he returned, and served in the armies of France. In the service of Louis XIV. he distinguished himself in a very high degree, and in 1703 he was appointed commander-in-chief of the troops sent into Spain to the assistance of Philip V., and intently obeying his duty as a general, he in a single campaign reduced a number of important places. As a reward for his great services, and for the many victories which he had obtained, he was made marshal of France in 1706. In the same year he returned to the command in Spain, and signalized his military skill by a campaign, in which, without fighting a battle, he obliged the enemy to evacuate Castile, "conducting them," says his biographer, "from port to port as a shepherd leads his flock." In 1707 he obtained a signal victory over the English and their allies, for which he received the highest honours in rank and titles that the crown of Spain could confer. He was afterwards entrusted with the army on the Rhine, opposed to that of the empire, and in 1710 he commanded in Dauphine, where with great skill he foiled all the attempts of the duke of Savoy with a superior army to break into France. He was now created a duke and peer of France by the title of Fitz-James. Notwithstanding his attachment and obligations to France, in the year 1710 he obeyed the orders of Louis, in taking upon the command of an army destined to invade that country, and soon made himself master of Fontarabie. He was afterwards commander-in-chief of the troops in the south-western provinces of France; and in the year 1720 was made governor of Straubing. War being renewed between the empire and France, he was appointed general of the French army.
army in Germany, and, in 1734, undertook the siege of Philippoburgh, during which he was killed by a cannon-shot on June 12th, at the age of sixty-three. He was naturally of a cold, reserved, and satiric temper; but he was a man of principle, sincere, upright, and disinterested. He made few promiscuous and professions of friendship, but no man performed more services to his friends. He avoided all intrigues, and never spoke ill of any man. As a general his great talent was in defensive war, and he declared nothing so much as to have a good fortification to defend. He estimated his own merits with modesty, but was the public and general opinion of him, that his death was regarded by the French, in whose cause he died, as a great national calamity. Moreri.

FITZROY ISLAND, in Geography, a small island near the N.E. coast of New Holland; 5 miles N.E. of cape Grafton.

FITZSTEPHEN, William, in Biography, who flourished in the 12th century, was descended from a noble Norman family, and born in London. When he had made a considerable progress in literature at home, he went to France to complete his studies. Upon his return he entered into the monastic state at Canterbury, and by his learning and talents obtained the notice and patronage of the archbishop, Thomas Beckett. To this prelate he became attached by habits of intimacy and strict friendship, adhering most zealously to him and his cause in the different reverses of his fortune. After the murder of Becket he exhibited his attachment by drawing up a life of that prelate in the Latin language. The life of the archbishop is introduced by a description of the city of London, and a detail of the manners and customs of the inhabitants in that period. This is said to be the earliest account extant of London, and is to be seen in Stowe's Survey. Fitzstephen died in the year 1191.

FITZWILLIAM, in Geography, a township of America, in Cheshire county, New Hampshire, about 16 miles E. of Connecticut river, and separated from Royallton in Massachusetts by the state line; incorporated in 1773, and containing 1240 inhabitants.

FIVE BONNETS, a cluster of small islands in the Mergui Archipelago. N. lat. 10° 29'.

Five Brothers, a cluster of small islands in Lake Huron. N. lat. 44° 35'; W. long. 83° 28'.

Five Fathom bank, a bank in the East Indian sea. S. lat. 5° 53'; E. long. 119° 2'.

Five Finger's point, a cape on the S.W. coast of New Zealand, forming the north cape of the fourth entrance into Dusky bay; the rocks of which bear some resemblance to the five fingers of the hand. This point is a narrow peninsula stretching off from Resolution island, of a moderate and equal height, and wholly covered with wood.

Five Island harbour, a bay on the W. coast of the island of Antigua. N. lat. 17° 13'; W. long. 61° 35'.

Five Nations of North America, so called by English writers, are the Iroquois of the French, being the Mohawks, Oneckoes, Onondagas, Cayugas, and Senecas, forming five classes joined in an old confederacy of offence and defence.

Five leaved Grafs, Cinquefoil, in Heraldry, is used by such as would introduce a blazon by herbs and flowers instead of metals and colours, to signify vert or green.

FIVEL, in Geography, a river of Holland, which runs into the Eems, near Delfzyl, and gives name to a small country on its banks between Groningen and the mouth of the... small towns and villages.

FIUMARA di Murro, a town of Naples, in Calabria Ultra; 8 miles N. of Reggio.

FIUMARELLA, la, a river of Naples, which runs into the gulf of Squillace, 2 miles S. of Cantarezzo.

FIUME. See St. Veit.

FIUME FREIDLE, a town of Naples, in Calabria Citra; 11 miles W.S.W. of Cosenza.

FIUMICINO, a sea-port in the dominions of the Pope, at the mouth of the Tiber, with a custom-house, where vessels pay for their goods on board; 2 miles S.W. of Pons Venetus.

FIXATION, the act of fixing, or of rendering a thing firm and fixed. Fixation is applied in the general to any process that fixes and binds together what, of its own nature, is volatile; and enables it to sustain the loss of fire for some considerable time.

Geber defines fixation an operation whereby a volatile thing, i.e. a thing that cannot endure the fire, is rendered capable of enduring it. In the general, fixation is the changing of a volatile body into a fixed one.

Fixation, among Alchemists, denotes a peculiar preparation of mercury, whereby it is to be put in a condition to bear the fire without evaporating, or the hammer without flying or separating.

The alchemists hold, that if they had the true secret of fixing mercury, without the addition of any foreign, less heavy and solid ingredient, they could make gold, or at least silver.

M. Hamberg had a long process of many months to prepare an oil from the succulent matter of human excrements; which he imagined would have fixed mercury into silver: but it failed.

FIXED AIR. See Air, Carbonic Acid, and Gas.

Fixed Bodies, in the general, are those which neither the fire nor any corrosive has such effect on, as to reduce or resolve them into their component elements; or, absolutely to destroy them.

Chauvin holds it not sufficient to denominate a body fixed that it can withstand the fire or any one agent, but it should withstand all. He contends, that fixation should not be restrained, as it usually is, to an absorption from evaporation, but from destruction, or resolution into primary elements: in this sense, gold, precious stones, and glass, and even sulphur, and mercury itself, are properly fixed bodies; for mercury and sulphur retain their nature notwithstanding all their evaporation.

The chemists divide all natural bodies into fixed and volatile, i.e. such as bear the utmost force of the fire without dissipating or spending themselves in flame, and such as do not.

Of fixed bodies, the principal are platinum, gold, silver, precious stones, particularly the diamond: telluric &c.

Of all metals, gold and silver alone are fixed; i.e. on remaining a long time exposed to the most intense flame, they, alone, lose nothing of their weight.

Where this property should arise is difficult to say. If the reader is not contented with the causes enumerated under Fixity, he may add the following one from Boerhaave, viz. the homogeneity and equality of the parts. The parts, or gr. of gold being all homogeneous and equal, will equally sustain each other, and leave equal spaces between them: through which pores, when fused, the fire taking an equal passage, goes off, without carrying anything of the metal with it: or rather the particles of gold being of all others the most solid and heavy (as appears from the weight of that metal) and of all others the most strongly unison bound
bound together (as appears from the immense ductility of that metal), the force of the fire is not sufficient to overcome so powerful a resistance; the solidity of the particles, and their freedom from air, prevents their being rarefied, or set farther apart, which might lessen their specific gravity, and diminish their vis cohesivis: so that what has the chief effect in the raising of fumes and vapours, viz. the rarefaction or expansion of the body being here precluded, the metal maintains its natural weight and tendency to the centre.

Mr. Boyle, the Prince of Mirandola, M. Homberg, and others, have made numerous experiments on gold, silver, &c. to see how far their fixity extended; in these pure gold, kept in an intense heat for two months, lost nothing sensible of its weight; silver, under the like circumstances, and the like time, lost one-twelfth part of its weight; but Mr. Boyle attributes this to the metal's not being fine and pure.

Indeed, by the great burning glasses of Mefirs. Tschirnhausen and Villette, the mott fixed bodies, as gold itself, are rendered volatile, and lose of their weight; so that there is no body in all nature absolutely fixed.

Fixed Ecliptic, a certain imaginary plane, which never changes its position in the heavens from the action of any of the parts of the solar system on each other; but, like a centre of inertia, remains immovably fixed. The existence of such a plane is demonstrated by Laplace, who has shewn the method of determining it from the situations, velocities, &c. of the planets, and other bodies of the solar system. The rule for determining it is as follows.

If at any instant of time whatever, and upon any plane passing through the centre of the sun, we draw straight lines to the ascending nodes of the planetary orbits referred to this plane; and if we take on these lines, reckoning from the centre of the sun lines equal to the tangents of the inclinations of these orbits to this plane; and if, at the extremities of these lines, we suppose lines equal to the masses of the planets, multiplied respecively into the square of the radius of their orbits, and by the cubes of their inclinations; and lastly, if we determine the centre of gravity of this new system of bodies, then the straight line, drawn from the centre of the sun to this point, will be the tangent of the inclination of the invariable plane to the asumed plane; and continuing this line to the heavens, will there mark its ascending node.

Whatever changes the succession of ages may produce in the planetary orbits, and whatever be the plane to which they are referred, the plane determined by this rule will always be the same. It is true, its position depends on the masses of the planets, but those which have satellites have the greatest influence on its position, and the masses of the others will soon be sufficiently known to determine it with exactness. In adopting the values and the elements of their orbits, as given under Element, we find that the longitude of the ascending node of the invariable plane was 102° 56′ 56″ at the commencement of 1750, and at the same time its inclination to the ecliptic was 1° 35′ 40″. In this computation we have neglected the comets, which, nevertheless, ought to enter into the determination of the invariable plane, since they make part of the solar system. It would be easy to include them in the preceding rule, if their masses, and the elements of their orbits, were known. But in our present ignorance of the nature of these objects, we suppose their masses too small to influence the planetary system, and this is the more probable, since the theory of the mutual attraction of the planets suffices to explain all the inequalities observed in their motions. But if the action of the comets should become sensible in length of time, it should principally affect the position of the plane which we suppose invariable, and in this point of view, the consideration of this plane will still be useful, if its variations could be recognized, which would be attended with great difficulties.

The situation of this fixed ecliptic is at present nearly half way between the orbits of Jupiter and Saturn, and it is inclined in a small angle to the plane of the earth's orbit or true ecliptic.

The property by which it is determined is that the sum of the areas described by the radius vectores of the bodies of the system multiplied respectively by the masses of these bodies, is a maximum.

Fixed Line of defence, a line drawn along the face of the bulwark, and terminating in the curtain. See Defence.

Fixed Nitre, a preparation of saltpetre, made by fusing it in a crucible, and then inhaling it, with throwing in a few coals; and thus again and again, till no more flame or detonation arise; then letting it cool, they pulverize and dissolve it in water, and afterwards evaporate it into a fine white salt, which serves to draw the frits out of vegetables. This salt, per diem, yields what they call the liquor of fixed nitre.

Fixed Salts, are those extracted or gained from bodies by calcination and leution. See Salts.

They are called fixed, because the fire was not able to sublimate or raise them; as those carried off in the course of calcination by the sublimation of fire are called volatile.

The ashes of all plants yield fixed salts. See Lixivium.

Fixed Signs of the Zodiac, according to some, are the signs Taurus, Leo, Scorpio, and Aquarius.

They are so called because the sun passes them respectively in the middle of each quarter, when that fraction is more settled and fixed than under the sign which begins and ends it.

Fixed Stars are such as contantly retain the same position and distance with respect to each other.

By which they are contra-distinguished from erratic or wandering stars, which are continually shifting their situation and distance.

The fixed stars are what we properly and absolutely call stars; the rest have their peculiar denomination of planet and comet.

FIXEN, among Sportsmen. See Vixen.

FIXES is a name given by the workmen in gold and silver to a solution in salt, from its use in carrying down and fixing the heterogeneous acids mingled with aquafortis.

FIXITY, or Fixedness, in philosophy, the quality of a body which denominates and renders it fixed; or a property which enables it to endure the fire and other violent agents.

According to Chauvin, fixity consists in this; that the component principles of the body are to eachly united or held so strongly, and are mixed in such proportion, that they cannot easily be divided either by fire or any other corrosive menstrua, or their integral parts separated and carried off in vapour; for a body may be fixed to be fixed in two respects.

First, when, on being exposed to the fire, or a corrosive menstruum, its particles are indeed separated, and the body rendered fluid, but without being resolved into its inert elements. The second, when the body sustains the active force of the fire or menstrea whereto its integral parts are not carried off in fumes. Each kind of fixity is the re-
full of a strong or intimate cohesion between the particles mixed.

FIXITY, or Fixedness, in Chemistry, is, in a peculiar manner, used for the affection opposite to volatility; i.e. the property whereby bodies bear the action of the fire, without being devitated in form or nature. The principal causes of fixity, or the qualifications that contribute most to the rendering a body fixed, according to Mr. Boyle, are, 1. That its corpuscles be finely of a certain proportionable bulk, too big and unwieldy to be carried by heat, or buoyed up in the air. 2. That they have also a proper degree of weight or solidity. 3. That their figure be such as unfitts them for evaporation or flying off; some being branched, others hooked, &c. So that being entangled with one another, they cannot easily be extricated, loosened and separated. To these may be added a fourth circumstance, viz. the nearness of the particles, and their being contiguous in a great many points, or large extent of surface, which produces a stronger force of attraction and cohesion.

FIXLMILLNER, Placidus, in Biography, was born at a village near Liez, in Auvergne, in May, 1720. He was educated by his uncle, Alexander, who was abbot of Kremmmunster, to whom that institution was indebted for the establishment of a school and observatory in a very early period he used to take much delight in delineating mathematical figures. At a proper time he went to Salzburg, where he went through a course of philosophy, and attended the mathematical lectures of professor Stuart, who had this peculiarity in his mode of teaching, that he never made use of figures, and yet gave to clear an idea of the different propositions as rendered the comprehension of them easy. In the year 1737, he took the vows of a monastic life, and applied himself diligently to the study of philosophy and mathematics. Nor was he left indifferent in laying a solid foundation in the modern and oriental languages, history, and antiquities. He obtained the degree of doctor in theology, and in 1745 took priest’s orders at his monastery. He also undertook the professorship of ecclesiastical law at the school belonging to the monastery, which was frequented by the young nobility from Auvergne; an office which he discharged for forty years. He was about the same time made dean of the higher schools, and regent of the young nobility. His general knowledge of the law rendered him a fit person to be consulted in regard to law-suits; and, on a similar account, he was appointed "Notarius Apostolicus in Curia Romana." As his high reputation brought many students to Kremmmunster, he did not confine himself to the public hours of teaching, but repeated his lectures privately, and was always ready to assist his hearers, and to give them every explanation in his power. Notwithstanding his diligence and zeal in the way of education, it was not on this that his fame was built; but his attachment to astronomy rendered him most conspicuous, and known in foreign countries. His uncle, Alexander, resolved, in the year 1747, to found an establishment in his monastery, for the purpose of diffusing mathematical knowledge. With this view, he fitted up an apartment to contain the necessary instruments, and for making experiments of every kind. He also caused an observatory to be built in his garden, and in the course of time Fixlmillner was appointed astronomer, retaining at the same time his office as professor of the ecclesiastical law. His application to the study of this science was so intense, that he made the most rapid progress in it, and published several works, in a few years, of great merit. His service, however, to practical astronomy confines chiefly in his having made and collected, at the desire of Lalande, a great many observations on Mercury, and thereby enabled the French astronomer to construct his tables of that planet. This service Lalande publicly acknowledged, and likewise inferred his observations in the supplemental volume to his astronomy. Fixlmillner was also one of the first astronomers who calculated the orbit of the Herschel planet, and constructed the tables which were adapted to it. He was the person who proved the truth of professor Bode’s conjecture, that the thirty-fourth star of Taurus, observed by Flamstead in the year 1690, was the new planet; and by applying Flamstead’s observations to calculation, he produced a theory which fully agreed with the phenomena of it. It would take us much beyond the limits allowed for the article, were we to attempt recording all that this active astronomer did for his favourite science. He had also an uncommon genius for mechanics, and invented many practical helps to observation; such as a new micrometer, and a machine for grinding concentric circles on glasses with great accuracy. His indefatigable industry injured his health; and he died in August, 1791, in the 71st year of his age. He was simple, uniform, and constant, like the laws of nature which he studied and illustrated; his character displayed that mildness and integrity, which never fail to inspire esteem and love. His life was passed in great harmony with his monastic brethren; and it was in his capacity of general joy to the whole establishment, when, in the year 1788, he celebrated the fiftieth anniversary of his residence in it.

FIXTELA, in Geography, a town of Morocco, 4 miles from Tetuz.

FIZES, Anthony, in Biography, an eminent physician of Montpellier, was the son of Nicholas Fizes, professor of mathematics in that university, and was born in the year 1690. He received his early education entirely from his father, who defined him his successor in the mathematical chair. But in the course of his attendance in the classes of the college, he acquired a great disposition to the study of medicine, which he pursued with so much ardour and advantage, that his father was induced to yield to his solicitations; and, notwithstanding the mediocrity of his income, sent Anthony to complete his medical education at Paris, under the tuition of Du Verney, Lemery, and the two Meilifs. De Jullieu. On his return to Montpellier, he employed himself in observing diseases in the hospital de la Charité, and in public teaching. On the death of his father, he was appointed joint professor of mathematics with M. De Clapiers, and became his sole successor. He held the mathematical chair until the labours of his medical course, and the extension of his practice, compelled him to resign it. In 1732, the medical professorship in the university became vacant by the resignation of M. Du Dider, and Fizes was elected his successor. He fulfilled the duties of this chair with great propriety, but with little zeal. It was in the practice of his profession that his superiority was particularly conspicuous, for he possessed an extraordinary talent for observation. Being endowed likewise with a sound judgment, and an uncommon memory, he appreciated at once the character of the most complicated disease; and was above all admired for the accuracy of his prognostics. These qualifications placed him at the head of his profession at Montpellier; his fame extended to the metropolis, and he was invited to the office of physician to the duke of Orleans. His age was now, however, advanced; and the fear of the jealousy which this high appointment might produce among his brethren, led him to make some efforts to be permitted to decline this honour. He removed to Paris, nevertheless; but, unwilling to the intrigue, and rat-
FLACCIUS, C. Valerius, a Roman poet, who flourished in the reign of Vespasian, and died at an early age, in the time of Domitian. From an epigram in Martial, it should seem that he was in no affluence; for he advised him as a friend to quit the modes for the more gainful pursuits of the forum. The work on which his fame rests as a poet is entitled "Argonautica," in eight books. It is in imitation of the Greek poem of Apollonius Rhodius on the same subject, and may rank among the most respectable of the Latin epics after the Iliad, the manner and style of which he aims at copying. The lost edition of it is that of Limpricht, 1724, in 4to. It contains sublime and splendid passages, and is free from the hamblab and extravagance of most of the second race of Latin poets; but it is in general deficient in poetical spirit, and is likewise wanting in plan and contrivance. Rom. Hist. See Flaccurtia.

FLACCUS, a Roman musician, who set the comedies of Terence to music.

FLACHSTADT, in Geography, a small island in the North Sea, about 40 miles from the coast of Norway. N. lat. 68.

FLACCIUS, or Franciscoz, Matthias, in Biography, was born at Ascona in Iulia, in the year 1520. His father, who was a literary man, undertook the education of his son; but dying while the youth was quite young, he fell into hands who were either incapable of affording him assistance, or negligent of the charge committed to their care. But by his own application, and some occasional assistance which he received from a learned Italian, he made considerable progress in classical literature and the belles lettres. He went to Venice, and studied under Pathila Egnatius; and when he was but 17 years of age, he felt a strong inclination for theological pursuits, and, from his straitened circumstances, was desirous of entering a monastery; but he was diffused from the plan, and went to Bafli, where he studied some months, and embraced the opinions of the reformers. From Bafli he proceeded to Tubingen, where he received the instructions of the celebrated Camerarius; and in 1541, he became the disciple of Luther and Melancthon, the latter of whom gave him very substantial proofs of his regard and liberality. After he had taken his degree, he married, and was appointed public professor of Wittenberg. During the war between the confederate Protestants and the emperor Charles V, the adherents were divided from the Saxony fanatics, and Flaccus went to Brunswick, where he obtained a high reputation by his lectures, and upon the termination of hostilities in 1547, he returned to Wittenberg, to resume his former situation in that university. In the year 1548, a controversy took place among the adherents of Luther, in which Flaccus published a leading part, and displayed much bigotry and intolerance. It originated in the debates among the Saxony divines concerning the expediency of submitting to the famous edict of Charles V, called the "interim." Melancthon and others concurred in the opinion, that in matters of inferior importance one was due to the imperial edicts; and in this they placed precedence things which had appeared of the highest importance to Luther, among which were the doctrine of justification by faith alone, the necessity of good works to salvation, the number of the sacraments, extreme unction, and certain rites and ceremonies relative to church discipline. On the other hand, the defenders of the primitive doctrines of Lutheranism, with Flaccus at their head, attacked with much bitterness and fury these accommodating divines, and accused them of apostasy from the true religion. Among other absurd notions which Flaccus, in the heat of argument, avowed, was this, that original sin was not an accident, but the very "substance" of human nature. The odium which he excited by embracing this strange notion, rendered it necessary that he should relinquish a professorship at Jena, which he had held five years; he accordingly withdrew to Ratisbon, where he continued to publish many books. In the year 1567, he was invited, with some other Lutheran ministers, to Brabant, to model some churches in that country on the principles of the Augsburg confession; but they were soon dispersed by the bloody persecution under the duke of Alva, when he removed to Straßburg, and afterwards to Frankfurt on the Main. The number of his adherents had greatly declined in Germany; and he died in 1575, when he had completed the 55th year of his age. He was a man of excellent talents, great learning, and overbearing zeal against papistry; but his turbulent, factional, and quarrelsome temper rendered his good qualities of little avail. He was the author of many works, which are enumerated at large by Moretus; the principal are, "Clavis Sacrae Scripturae,"
FLA


FLACOURTIA, in Botany, so named by L. Heritier, in memory of Stephen de Flacourt, a native of Orleans, fuperintendent of a colony for some time established by the French in Madagascar, and author of an account of that island, published in quarto at Paris in 1658, and at Troyes in 1661. He was the first who gave a history of the rich natural productions of that country, and through, as Hailer observes, not a deep naturalist, he was certainly not disinterested in observation. He describes many new and rare plants, especially such as are useful for food, giving figures of the leaves only. L'Herit. Strip. Nov. 59. Schreb. 702. Mart. Mill. Dict. v. 2. Art. H. Kew. v. 3. 413. Jull. 291. Cliffs and order, Directa Polyandra, Dryander. D. vauvandia, L'Herit. Nat. Ord. 71, cex, Jull.

Gen. Ch. Male, Cal. Perianth of one leaf, in five or more deep, roundish, obtuse, nearly equal, ascending segments. Cor. none. Stam. Filaments numerous, from 50 to 100, rather longer than the calyx, papillary, spreading, equal, inserted into a central hemispherical receptacle; anthers roundish, of two cells. Pist. wanting, though sometimes the abortive rudiments of one are discernible.

Female, Cal. Perianth inferior, of five or more roundish, erect, cloosed leaves, downy on their inside. Cor. none. Stam. none. Pist. German inferior, ovate, sessile, rather longer than the calyx; style none; stigma filiform, or from five to nine spreading, oblong, obtuse, furrowed rays. Peric. Berry globular, becoming angular by drying, umbilicated, of many cells. Seeds two in each cell, one over the other, obovate, compressed, with a furrow on the upper edge.


F. Ramonciti is the only known species. L'Herit. Strip. Nov. 59. t. 50. Lamarec t. 826. Native of Madagascar, where, according to Flacourt, it is called Aloe, and according to Poirier Ramonciti. This is a shrub eight or ten feet high. Branches spreading, alternate, round, smooth, leafy, dotted, armed with five lateral spines. Leaves alternate, on short downy stalks, spreading, ovate, acute, smooth, veiny, with many shallow furrows, often purplish at the edges. Stipulas none. Flowers small, few, in terminal clusters; the male ones chiefly conspicuous by their yellow anthers; the female appearing before the fresh leaves come out. Fruit like a small plum, at first green, then of a fine red, and finally of a deep violet, sweet and edible, but leaving a slight acrimony in the mouth. Seeds bitterish, like the kernel of a cherry. An island on the coast of Madagascar, to leagues to the south of Point point, was named by the French l'ile aux pruniers, plum island, because they found it covered with bushes of Ramonciti.

Propagation and Culture.—This shrub flowers in our flowers in June and July, but has not yet produced any fruit. L'Heritier says both sexes bloomed at Paris, where the plant was kept in the green-house, but he had never happened to see them both in one summer. It is propagated by cuttings or layers, but has little beauty or utility to recommend it to our care in this country.

FLADABUNA, in Geography, a small island near the N.W. coast of Scotland; 7 miles N. from the island of Skye. N. lat. 57° 32'. W. long. 6° 17'.

FLADD, a small island of Scotland, near the N.E.

coat of the island of Skye. N. lat. 57° 37'. W. long. 6° 30'.

FLADDA, three small islands among the western islands of Scotland, about 1 mile W. from the island of Sandera. N. lat. 56° 37'. W. long. 7° 32'.

FLADHUNA, an inconsiderable island of Scotland, to the north of Huisn, not far from Skye, and at some distance from the coast, which was formerly inhabited. In its vicinity are six or seven rocks, one of which is about 300 paces in circuit, and flat on the summit, with a deep well in it.

FLADSTRAND, a sea-port town of Denmark, in North Jutland, and diocese of Aalborg, on the east coast, with a harbour defended by three forts. The chief employment of the inhabitants is fishing; 30 miles N.W. of Aalborg. N. lat. 57° 27'. E. long. 10° 32'.

FLADUGEN, a town of Germany, in the bishopric of Wurzburg; 40 miles N. of Wurzburg. N. lat. 52° 37'. E. long. 10° 29'.

FLAG, a general name, including colours, standards, banners, ensigns, &c. which authors frequently confound with each other.

The fashion of bearing the flags pointed or triangular, which now obtains, Roderich. Toletania afforts us, came from the Mahometan Arabs or Saracens, upon their seizing of Spain, before which time all the ensigns of war were square, stretched, or extended, on crosst pieces of wood, like church-banners; on which account they were called in Latin vaga, q. d. vaga, a cell diminutus, as is remarked by L'Heritier.

The pirates of Algiers, and those throughout the coast of Barbary, are the only people who bear a hexagonal flag. It is gules, charged with a Morock head, coiled with its turban, &c. though this be expressly contrary to their law, which prohibits the making any image or representation of a man, founded on an opinion, that they who make them shall be obliged at the day of judgment to find souls for them, and that in defiance hereof they shall be damned. But this portrait which they carry is that of Halil, Mahomet's son-in-law, to whom party the Africans all return, who ordered that his effigy should be expressed on their flags and standards, believing himself to be formidable to the Christians, that the bare sight of his image would carry undoubted victory over them. L'Heritier.

Flags, in the Military Art, are small banners of distinction stuck in the baggage-wagons of the army, to distinguish the baggage of one brigade from another, and of one battalion from another, that they may be marshaled by the waggon-masters-general, according to the rank of their brigades, to avoid the confusion that otherwise might arise. See Colours and Standards.

Flag is more particularly used in Sea-Language, for the colours, ancient, standards, &c. borne on the top of the masts of vessels, to signify the quality of the person who commands the ship, of what nation it is, and whether it be equipped for war or peace.

In the British navy flags are either red, white, or blue, and are displayed from the top of the masts of vessels, to signify the quality of the person who commands the ship, of what nation it is, and whether it be equipped for war or trade.

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music Loricata), that in six days he could discharge an entire century, by a whipping of three hundred thousand flutes. His example was followed by many penitents of both sexes; and as a vicarious sacrifice was accepted, a family disciplinarian might expiate on his own back the sins of his benefactors. These compensations of the purifies and the penitents, introduced, in the 11th century, a more honourable mode of satisfaction, the merit of military service, which was followed by the crucifaces. See Croisades, Discipline, Indulgence, and Penance.

The parliament of Paris prohibited all public flagellations by an act of 1693. See Flagellantes.

Flagellation is a term more peculiarly appropriated to the sufferings of Jesus Christ, when whipped and lacerated by the Jews; from the Latin, flagellum, a scourge, or whip.

We say, a painting of the flagellation; or simply, a flagellation, to denote a picture or print representing this torment inflicted on the sufferer of the world.

In this sense we say the flagellation of such a painter, &c.

Flagellation, Feasst spec. See Diamastigosis.

Flagelliformia Caulis, in Estonia, a long and pliant stem in which Periploca gregga, and many other plants. See Caulis, where this term is accidentally omitted. The common jasmine is a good example of it.

Flagelloe, a flagellum, a kind of little flute; or a musical instrument of the flute kind, used chiefly by shepherd and country people.

It is usually made of box, or some other hard wood, sometimes of ivory. It has five holes or flaps, besides that at bottom, the mouth-piece, and that behind the mouth, &c.

The ambit of the flagellum, according to the scale exhibited by Mercenius, is two octaves from g to e at upwards.

Flaherti, Roderic, in Biographia, an Irish antiquarian and historian, who published at London, A.D. 1685, a book under the singular and mystic title of "Ogygia, or Rerum Hiberniarum Chronologia," containing chronological memoirs upon the antiquities of the kingdom of Ireland; compiled, as he observes, "ex pervetuti monumentis fidele rer coelatis cras, atque facris et potentibus litteraris primoribus orbis gentium, tum genealogiae, quum chronologiae suffulta praestat." This work, a quarter-volume containing about 600 pages, he dedicated to the then duke of York, afterwards king James II. of England. The author commences his history from the deluge, continues it to the year of Christ 528, and has divided it into three parts. The first describes the island, its various names, inhabitants, extent, kings, the manner of their annual election, &c. The second is a kind of chronological parallel of the Irish affairs with the events that happened during the same period in other countries. The third is a more ample detail of particular transactions, in the same kingdom. To this is added a profoundly exact chronological table of all the Irish kings who have ruled over Ireland, from A.D. 282 till A.D. 1022; and a brief relation of the most prominent historic features of the island, till the time of Charles II., in 1685. To this succeeds a chronological poem, which forms a summary of Irish history to the same period. At the end is a very curious catalogue of the Scottish kings,Irish, who have reigned in the British isles. In his genealogical remarks on the regal house of the Stewarts, the author attempts to prove they were originally an Irish family. It is surprising, that neither the author nor his work has been noticed by Macpherson or Whisker in their controvery respecting the peoples of Hibernia, and the origin of the Caledonians; although he is particularly noticed by O'Halloran in his History of Ireland. See Moreri, Grand Dict.Hist.

Flagellum, in Rural Economy, a well known implement or tool made use of in threshing different sorts of corn. It consists of a hand-flail, and a short beating part, which are attached to each other by a strong thong of leather, passing through loops or flaps, fixed on the ends of the different pieces. Since the introduction of machines for threshing, the flail method has been much less had recourse to, except upon farms of small extent, as being more laborious and troublesome, and his expedients in the execution of the work. See Threshing Machine.

Flagel, in Sea Language. The seamen say that the work doth flour-overs, when a ship being houled in near the water, so that the works hang over a little too much, and thus is let out broader afloat than the due proportion will allow.

Flamis, in Ichthyology, a name given by some to the skate, a species of raja.

The ancient Greeks called this bato, when they spoke of the male, and of the female, latis.

Flag, in Gardening, a name given by florists to those flowers of the carnation kind which have only two colours, and very large stipes, all of which go quite through the leaves.

Flag, White, in Painting, is lead corroded by means of the preluding of grapes, or a curvile prepared by the acid of grapes. It is brought here from Italy, and far surpasses, both with regard to the purity of its whites and the certainty of its blending, all the curvile or white lead made with us in common. It is used in oil and varnish painting, for all purposes where a very clean white is required. The white flag should be procured in lumps as it is brought over, and levigated by those who use it, because that which the colourmen fell in a prepared lode is levigated and mixed up with flars, and often with white lead, and worse sophifications.

Flamant, of Flamingo, in Ornithology. See Phoenicopterus ruber.

Flamantville, in Geography, a sea-port town of France, in the department of the Channel, with a good harbour, 10 miles S.S.W. of Cherbourg.

Flambeau, or Flamboy, a luminous made of several thick wicks, covered over with wax, serving to burn at night in the streets, &c. as also at funeral processions, illuminations, &c.

Flambeaux differ from lights, torches, and tapers. See Torch.

They are made square, sometimes of white wax, and sometimes of yellow; they usually consist of four wicks or branches near an inch thick, and about three feet long, made of a sort of coarse hempen yarn, half twisted. They are made with the ladle, much as torches or tapers are, viz. by first pouring the melted wax on the top of the several supended wicks, and letting it run down to the bottom; this they repeat twice. After each wick has thus got its proper cover of wax, they lay them to dry; then roll them on the table, and so join four of them together by means of a red-hot iron.

When joined, they pour on more wax till the flambeau
is brought to the size required, which is usually from a pound and a half to three pounds.

The last thing is to finish their form or outline, which they do with a kind of polishing instrument of wood, by running it along all the angles formed by the union of the branches.

The flambeaux of the ancients were different from ours. They were made of woods, dried in furnaces, or otherwise. They used diverse kinds of woods for this purpose; the wood most usual was pine. Pliny says, that in his time they frequently also burnt oak, elm, and larch. In the seventh book of the Antiquities, mention is made of a flambeau of pine; and Servius, on that passage, remarks, that they also made them of the cornel tree.

FLAMBO, in Natural History, a name given by some to a long anguilliform fish, called euryagra. See Cephalosoma.

FLAMBOURGH, in Geography, a township of England, in the West Riding of Yorkshire, on the coast of the German sea, containing about 730 inhabitants; 3 miles by N. of Flamborough Head, a lofty cape or promontory of England, on the E. coast of the county of York. N. lat. 54° 8' W. long. 0° 2'.

This promontory is formed of lime-stone of a snowy whiteness, and stupendous height, visible far off at sea. A light-house has been lately erected on this head, in which is exhibited a triangular revolving light, distinguish'd from the revolving lights of Tynemouth and Cromer by shewing a face every two minutes, one of them being coloured red.

FLAMBOURGH, a factory of the Hudson bay company, on the south-western side of Hudson bay.

FLAMBOURGH, a township in Upper Canada, distinguish'd by E. and W. Flamborough, in the West Riding of the county of York, and lying W. of the Missisaga lands, and fronting Dundas street.

FLAME, (flamma, Latin,) is the actual burning; attended with heat and light, of a volatile combustible substance; and this substance may be either a comminuted solid, (viz. a powder,) or a vapour, or a gas.

The powder of rosin, and of other brittle resinous bodies, the fibres of several plants, and some other powdered combustibles, when projected through the flame of a candle, or of a piece of burning paper, instantly take fire, and the flame spreads through the whole pow'dery cloud. Powders of this sort are used at the play-houses for representing a flash of lightning or other sudden light. Powdered rosin, and the powder of lycopodium, have been found to produce this effect equally well; yet the latter, when it may be procured, is by far preferable to the former, and that on account of its being an unadulterated light powder, easily spru'lled off from any thing, whereas the powdered rosin sticks to, and foils every thing that it happens to fall upon.

The vapour of certain inflammable fluids, such as spirit of wine, ether, spirit of turpentine, &c. is instantly inflamed by the contact of a candle, or other flaming body, or by a spark of electricity, and continue to burn as long as there is a sufficient supply of it.

The inflammable gases, when they are extricated either by the action of heat, or otherwise, from substances that contain them, may also be inflamed, and will burn in a similar manner. Thus, if iron filings and diluted sulphuric acid be placed in a bottle, an effervescence takes place, together with a copious production of hydrogen gas, which comes out in a stream from the aperture of the bottle, and it may be inflamed either by a lighted candle, paper, wood, &c. or by puffing an electric spark through it. Thus also, when coals are lighted in a common fire, the heat softens their bituminous parts, and expels the inflammable gases, which burn and consolute the flame, as every body must daily experience. But besides the inflammable gases, heat expels from coals an aqueous vapour, a thick fluid like tar, and some gases that are not of a combustible nature, and these products are neither equal nor constant, that is, sometimes some of them predominate, and sometimes the other. The consequence of which is, that the flame of coals is continually waving both in shape and intensity of colour. It frequently shifts from one place to another, and what gave a beautiful white light a few seconds before, has become a stream of dense and dark smoke. It may be hardly worth observing that the changeable inclination of the flame is owing to the motion of the air, which runs towards the fire in various directions.

The like thing takes place in the combustion of wood, and vegetable matter in general. The heat extricates the volatile and inflammable materials which take fire, and produces the flame.

In the combustion of charcoal, and of coal, (viz. carboniferous mineral coal,) the flame and the smoke are very trifling, because the operation of charring has previously expelled from those materials a great portion of their volatile ingredients.

With respect to the process of the combustion, the five requisites are necessary with the combustion of volatile substances, which produce the flame, as with the combustion of solids; viz. the combustible must be heated to a certain degree, a fire must be communicated, and the combustion can only take place in contact with oxygen gas, or with substances which contain oxygen. See Combustion.

Thus, we have given a general sketch of the nature of flame; but there are several remarkable particulars belonging to every part of the above mentioned process, which are highly deserving of notice, and which, of course, we shall now endeavour to point out successively.

The purposes for which mankind employ light, or combustion in general, are either for the use of the heat, or for the use of the light. The heat is subservient to the numerous and important purposes of cooking victuals, of warming apartments, and thus rendering inhabitable such climates, as otherwise the human species could not live in; of giving existence to all metallicurgic operations, to the making of glass, of lime for building, &c. &c. The light is subservient to purposes equally important. In short, it enables human beings to follow their operations, during the absence of the day-light merely, if not full as well, as in the day-time. The flame of a single candle animates a family; every one follows his occupations, and no dread is felt of the darkness of night. Were it not for artificial light, how great a portion of the advantages of industry, and of real comfort, would the human species be deprived of.

When heat is wasted, then rough solid combustibles are used, which give it in abundance, and at a cheap rate; but when light is wanted, then the purest and the most uniform combustibles must be used, otherwise an indiffere't effect is produced, and a considerable quantity of materials is expended. In some uncivilized countries, flax-seed faggots of some kind of resinous wood are used by way of candles. When lighted at one end they burn gradually, and afford a good deal of light, but it is indifferently, and encumbered with a good deal of smoke. Besides, these faggots are readily burnt out, and must be quickly replaced by new ones.

At present, in all civilized countries, the principal combustibles
bubbles that are used for the production of a bright and luminous flame, are wax, the fat of animals, under the general name of tallow, oil, either of fish or of vegetables, and the inflammable gas of coals, which has but lately been introduced, at least in this country. The extensive consumption of these materials, and the successive increase of their price, has obliged the industrious to devise the best means of producing the greatest effect with the least possible quantity of materials.

Wax, tallow, and oils must be rendered volatile before they will produce a flame, but for this purpose it is sufficient to volatilize a small quantity of any of them, successively; for this small quantity will suffice to give a useful flame, and hence we must admit the simple, yet wonderful contrivance of a common candle or lamp. This contrivance contains a considerable quantity of the combustible subflance, sufficient to last several hours; it has likewise, in a particular place, a flender piece of porous vegetable subflance, called the wick, which in fact is the fire place, or laboratory where the whole operation is conducted. The wick which, in the formation of the candle, or preparation of the lamp, has been partly or entirely soaked in the wax, or tallow, or oil, is set fire to by the approach of some other subflance actually burning; this heat renders volatile and inflames that part of the wax, oil, &c. which is in the wick, and at the same time softens which is next to it; the first portion of the wax, &c. being thus consumed, the wick is, in consequence of its capillary attraction, enabled to imbibe more materials for the maintenance of the flame, and so on in succession until the whole is exhausted.

There is a circumstance frequently attending the first lighting of a candle, which demands a short explanation in this place. It is, that at first the candle sometimes burns dimly, and looks as if it would go out. The method of reviving the flame in such cases is to lift up the candle perpendicular with a quick motion, three or four times successively, which action in some degree re-adjusts the flame, and the position of the first dimness is that the wax or tallow, by being too cold or too hard, is not melted by the combustion of that small portion which is in the wick, and of course cannot supply the waste of the wick; but by the lifting up of the candle, the air heats down the flame upon the wax or tallow adjoining to the wick, which melts it, and enables it to run up into the pores of the wick, where it is rendered volatile, and is inflamed, &c.

That part of the combustible which is successively rendered volatile by the heat of the flame is not all burnt, but part of it escapes in the form of smoke through the middle of the flame, because that part cannot come in contact with the oxygen of the surrounding atmosphere; hence it follows, that with a large wick and a large flame, this waffle of combustible matter is proportionately much greater than with a small wick and a small flame. In fact, when the wick is not greater than a single thread of cotton, the flame, though very small, is, however, peculiarly bright, and free from smoke; whereas in lamps with a very large wick, such as are often suspended before butcher's shops, or with those of the lamp lighters, the smoke is very offensive, and in great measure eclipses the light of the flame.

In order to avoid this inconvenience, the ingenious Mr. Argand made that famous contrivance of a lamp, which now justly goes by his name. He made the burner or wick thin and circular, with a free passage for the air through the middle. In this construction a very thin and circular flame comes in contact with a vast quantity of air both within and without the circle, in consequence of which none of the volatilized oil escapes without burning, and the flame is very brilliant and active. This shows the reason of what is commonly said of this lamp, namely, that it consumes its own smoke. With respect to the original contrivance, and the successive improvements of this admirable lamp, we must refer the reader to the article LAMP.

Instead of a circular form, the wick has also been made thin and oblong; but though this construction has some advantage over the common lamp, yet it is far inferior to Argand's. A circular or an oblong wick has likewise been tried in wax or tallow candles, but the attempts have not been attended with any remarkable advantage.

Another consequence of the want of oxygen in the middle of the large flame of a lamp or candle, is the formation of a cloudy concretion at the extremity of the wick. This arises from the coaly or groffer particles of the combustible which are too large to be volatilized, and at the same time do not come in contact with the oxygen which is necessary for their combustion; hence they accumulate and spread out something like a fungus. If the wick be incised a little, so that the end of it may project out of the flame, which always goes straight upwards; then no coaly concretion is formed. In the lamps which illuminate the streets of London, the wick lies nearly horizontal, in consequence of which they seldom contract any coaly concretion.

Of the three principal materials for producing a useful bright flame, viz. wax, tallow and oil, the first and second are mostly used within doors in this country; but the fifth oil, the combustion of which is attended with an unpleasant smell, is mostly used for street lamps and other out of doors purposes; excepting indeed when Argand's lamps are used, for in these the oil gives no bad smell. Oil of olives burns without any offensive smell; therefore much use is made of it for lamps in private houses in those countries where it may be had at a cheap rate, as in Italy, the south of France, &c.

Besides the above, a new material has of late been attempted to be introduced in this country, for the purpose of lighting houses, streets, manufactories, &c. the material is the inflammable gas of coals. Every body must know, that when coals are burning in a common fire place, a flame more or less luminous (according as it is more or less enceumered with incombustible smoke and vapour) issues from them; and they frequently emit some very beautiful streams of flame remarkably bright. All this, as we have already mentioned, arises from the gases which are excreted from the coals by the heat. It was natural to imagine that such gas might be received in proper receivers, and might afterwards be forced out of small apertures, which being lighted might serve, as the flames of candles, to illuminate a room or other place. The trial was easily made, and it was attended with the desired effect. The principle of the apparatus and of the operation is as follows: The coal is placed in large iron vessels, called retorts, to the apertures of which iron pipes are adapted, which terminate in a vessel, or vessel, called gasometers, or receivers, which is inverted in water. The retorts thus charged are placed upon the fire, the heat of which extracts the gas from the coals that are within the retorts, together with an aqueous vapour, a thickish fluid, or tar, &c. These products are conveyed through the above-mentioned pipes under the gasometers where the gas is washed, and remains ready for use. There are then other smaller pipes from the gasometer, which branch out into smaller ramifications, until they terminate into the places where the lights are wanted. The extremities of the pipes have small apertures, out of which the gas issues, and the flames being lighted at those apertures, will burn with a clear and constant flame as long as the supply of gas continues. All the pipes which come from the gasometer
The method of producing the gas being thus contrived, the next step was to determine how far such lights might be employed, consistently with expense, safety, &c. A few shops in London were lighted with it, but the use was soon discontinued, as it was found, principally on account of the unpleasant smell. A proposal, and some attempts were made for lighting some of the streets of London by means of this coal gas; but either the mysterious nature of the propo-

sals, or the expence attending the operation, or some other cause of obstruction, has not as yet allowed the adoption of the plan. Other attempts of the like nature have been made elsewhere, but of their success we have no authentic account, excepting however one, which was laid before the Royal Society by the operator, Mr. Murdoch, and is published in the Philosophical Transactions for the year 1828. The precision with which the particulars are stated in Mr. Murdoch's account, and the essential use of which such statements may be to a vast number of persons, who are now engaged in similar examinations in this new branch of civil economy, induce us to transcribe the most essential part of the account in the present article; referring to add what future improvements may come to our notice to the article Gas Lights.

"These facts and results, Mr. Murdoch says, were made, during the present winter, at the cotton manufacture of Melfi's. Philips and Lee, at Manchester, where the light obtained by the combustion of the gas from coal is used upon a very large scale; the apparatus for its production and application having been prepared by me at the works of Melfi's. Bolton, Watt, and Co. at Soho.

"The whole of the rooms of this cotton mill, which is, I believe, the most extensive in the United Kingdom, as well as its counting-houses and store-rooms, and the adjacent dwelling house of Mr. Lee, are lighted with the gas from coal. The total quantity of light used during the hours of burning has been ascertained, by a comparison of shadows, to be about equal to the light which 2500 mould candles, of six in the pound, would give; each of the candles with which the comparison was made consuming at the rate of 4-10ths of an ounce (175 grains) of tallow per hour.

"The burners are of two kinds: the one is upon the principle of the Argand lamp, and resembles it in appearance; the other is a small curved tube with a conical end, having three circular apertures or perforations, of about a thirtieth of an inch in diameter, one at the point of the cone, and two lateral ones, through which the gas issues, forming three divergent jets of flame, somewhat like a fiver-de-lis. The shape and general appearance of this tube has procured it, among the workmen, the name of the cockspur burner.

"The number of burners employed in all the buildings amounts to 271 Argands, and 633 cockspurs; each of the former giving a light equal to that of four candles of the description above-mentioned, and each of the latter a light equal to two and a quarter of the same candles; making therefore the total of the gas light a little more than equal to that of 2500 candles. When thus regulated, the whole of the above burners require an hourly supply of 1250 cubic feet of the gas produced from cannel coal; the superior quality and quantity of the gas produced from that material having given it a decided preference in this situation over every other coal, notwithstanding its higher price.

"The time during which the gas light is used may, upon an average of the whole year, be rated at least at two hours per day of 24 hours. In some mills, where there is over-work, it will be three hours; and in the few where night work is still continued nearly twelve hours. But taking two hours per day as the common average throughout the year, the consumption in Melfi's. Philips' and Lee's mill will be 1500 \( \times \) 2 = 2500 cubic feet of gas per day; to produce which 700 weight of cannel coal is required in the retort. The price of the best Wigan cannel (the fort used) is 15\( d. \) per cwt. (1.47, per ton) delivered at the mill, or at about eight shillings for the seven hundred weight. Multiplying by the number of working days in the year (313), the annual consumption of cannel will be 110 tons, and its coal 15.7.

"About one-third of the above quantity, or 40 tons of good common coal, value ten shillings per ton, is required for fuel to heat the retorts, the annual amount of which is 227.

"The 110 tons of cannel coal, when distilled, produce about 21 tons of good coal, which is sold upon the spot at 1s. 4d. per cwt. and will therefore amount annually to the sum of 93.

"The quantity of tar produced from each ton of cannel coal is from 11 to 12 ale gallons, making a total annual produce of about 1270 ale gallons, which not having been yet sold, I cannot determine its value.

"The interest of the capital expended in the necessary apparatus and buildings, together with what is considered as an ample allowance for wear and tear, is fixed by Mr. Lee at about 55\( d. \) per annum, in which some allowance is made for this apparatus being made upon a scale adequate to the supply of a still greater quantity of light, than he has occasion to make use of.

"He is of opinion that the cost of attendance upon candles would be as much, if not more, than upon the gas apparatus; so that, in forming the comparison, nothing need be flouted upon that score, on either side.

"The economical statement for one year, then, stands thus:

\[
\begin{array}{ll}
\text{Coal of 110 tons of cannel coal} & \text{£125} \\
\text{Ditto of 40 tons of common ditto} & \text{£20} \\
\text{Deduct the value of 70 tons of coal} & \text{93} \\
\text{The annual expenditure in coal, after deducting the value of the coal, and without allowing any thing} & \text{92}
\end{array}
\]

\text{And the interest of capital, and wear and tear of apparatus} & \text{550}

\text{Making the total expense of the gas apparatus per annum, about} & \text{620}

\text{That of candles, to give the same light, would be about} & \text{2000.}

\text{For each candle, consuming at the rate of 4-10ths of an ounce of tallow per hour, the 2500 candles burning,} & \text{620}

\text{upon an average of the year, two hours per day, would, at one shilling per pound, the present price, amount to nearly} & \text{2000.}

\text{the sum of money above-mentioned.}

"If the comparison were made upon an average of three hours per day, the advantage would be still more in favour of the gas light.

"At first, some inconvenience was experienced from the smell of the unconfined, or imperfectly purged gas, which, may in a great measure be attributed to the introduction of successive improvements in the contrivance of the apparatus, as the work proceeded. But since its completion, and since the persons to whose care it is confided have been
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Some familiar with its management, this inconvenience has been obviated, not only in the mill, but also in Mr. Lee's house, which is most brilliantly illuminated with it, to the exclusion of every other species of artificial light.

"The peculiar softness and cleanliness of this light, with its almost unvarying intensity, have brought it into great favour with the work-people. And its being free from the inconvenience and danger resulting from the spars and frequent snuffing of candles, is a circumstance of material importance, as tending to diminish the hazard of fire, to which cotton mills are known to be much exposed."

In the burning of candles or oil lamps, the heat of the flame softens and attenuates the materials, and converts them partly into an elastic fluid which takes fire successively and maintains the flame. In the burning of coals, wood, turf, &c. various gasses, as well as vapours, are extracted from them, but these products are not all combustible; therefore those which are not combustible tend to check the activity of the flame which arises from the combustion of the others. The gasses which are principally extracted from the above-mentioned materials are hydrogen gas, azotic gas, and carbonic acid gas; the first of which only is highly inflammable in all its combinations; and it is hardly ever yielded pure by any of the above-mentioned materials. Its usual combinations are either with sulphur, or with carbon, or with phosphorus; hence it derives the denominations of sulphurated, carbureted, or phosphorated, hydrogen gas.

The flames of different combustibles are not all attended with an equal production of heat and light. Sulphur burns with a weak flame; phosphorus with a very dense one. Spirit of wine burns with a very light flame in point of light, but a very powerful one with respect to heat; so that if an Argand Lamp be charged with oil, and another similar lamp be charged with spirit of wine, the flame of the latter will not have a quarter of the light of the other, but it gives more than twice as much heat as the other. The flame of spirit of wine is not accompanied with any smoke. The flame of ether is denser, but produces smoke. The flame of spirit of turpentine is attended with a very dense smoke. The flame of pure hydrogen is very faint. This flame of hydrogen produces a remarkable phenomenon, which deserves to be mentioned in this place.

If a phial, containing the materials proper for the production of hydrogen gas, (viz. iron filings and diluted sulphuric acid,) be furnished with a tube having a small aperture for the exit of a stream of the gas, and if this stream be lighted, a flame will continue to burn at that aperture as long as the materials continue to give out the gas. Now, if a glass tube of about an inch in diameter, and about a foot long, be held straight up, with its aperture just over the above-mentioned flame, a sound will be heard, somewhat like a delicate sound of an organ pipe. This sound varies according to the size of the tube. No very satisfactory explanation has, as yet, been given of this singular phenomenon.

The flames of volatile combustibles that are more compound in their nature, vary considerably with respect to the intensities of their heat and light. A curious phenomenon takes place in uniting the flames of two candles, viz. the light is considerably increased. Let a person hold two candles before his face, at first separate, and then with their flames joined. Upon the junction of the two flames, his face will appear much more illuminated than it was before.

It is conjectured," Dr. Priestley says, "that the union of the two flames produces a greater degree of heat, and that this causes a farther attenuation of the vapour, and a more copious emission of the particles of which light consists."

The effects which we have just been enumerating are such as take place in common atmospheric air.

The various colours of the flames of simple and compound bodies are likewise highly deserving the attention of philosophers. Certain combustibles, even of the purest kind, burn with flames having peculiar tints; but much stronger colours may be communicated to their flames by the admixture of various substances, especially of those that are of an earthy or metallic nature.

The flame of a common candle is far from being of an uniform colour. The lowest part of the flame is always blue; and when the flame is sufficiently elongated, so as to be ready to smoke, the tip is always red.

As for the colours of flames that arise from coals, wood, and other usual combustibles, their variety, which hardly amounts to a few shades of red, or purple, intermixed with the bright white light, seems principally to arise from the greater or less admixture of aqueous vapour, dense smoke, or in short, of other incombusible products.

Spirit of wine burns with a blueish flame. The flame of sulphur has nearly the same tinge. The flame of zinc is of a bright white. The flame of most of the preparations of copper, or of the substances with which they are mixed, is greenish-blue. Spirit of wine, mixed with common salt, burns with a very unpleasant effect, as may be experienced by looking at the spectators who are illuminated by such light. If a spoonful of spirit of wine and a little boracic acid be stirred together in a cup, and then be inflamed, the flame will be beautifully green. If the spirit of wine be mixed with a little iron oxide in powder, or with any of its saline preparations, it will afterwards, on being inflamed, burn with a red, or rather purple flame. If the spirit of wine be mixed with barytes, its flame will have a beautiful yellow appearance. Such are the principal means of colouring flames, the admixture of various other substances will also impart some shades of colour to flaming bodies, but not nearly so strong as the above.

Some years ago an elegant and curious exhibition, under the title of "Philosophical Fire-works," was shewn in London by an industrious foreigner, named Diller. The exhibition consisted of the flames of certain gasses or vapours which issued out of a variety of small apertures at the ends of short tubes, which were disposed in the forms of wheels, pyramids, spirals, tridents, &c. Out of these apertures the flames were gradually made to increase and decrease alternately; so that sometimes the room looked as bright as if it were illuminated by the sun, and at other times the flames would be barely discerned. But the most pleasing effect arose from the colours of these flames, as there were beautiful greens, yellows, reds, purples, &c. Mr. Diller died, and it seems that he did not leave the secret of the preparations behind him; for no one has since been able to exhibit anything equal to those philosophical fire-works. The smell of ether, which predominated in the exhibition room, seemed to shew that Mr. Diller made great use of that liquid.

The combustible vapours and gasses are not all inflamed with equal readiness. Hydrogen gas may be inflamed not only by the contact of another flaming body, but even by a very small electric spark. An electric spark a little more powerful will set fire to spirit of wine and ether, especially when those fluids are a little warm. Spirit of turpentine, and some effential oils may be inflamed, not only by the above-mentioned means, but even by the action of cold acids. Put about a spoon full of oil of turpentine in a cup, and pour over it about half that quantity of strong nitrous acid previously mixed with a few drops of sulphuric acid. The oil
of turpentine will immediately burst out into a flame merely in conformance of the action of the acid.

The thick fat oils must be heated to a considerable degree, and in that state a flaming body must be brought in contact with their vapour, before they will be inflamed. Even when raised to a very high temperature, they seldom will of themselves burst out in a flame. If a vessel containing oil be set upon a fire, a smoke or vapour begins to rise from it, which grows by degrees denser and denser; and at last it begins to shine in some places near the surface of the oil, somewhat like an electric light; yet it does not flame; but if in this state a flaming body, like a candle, &c., be brought within the vapour, the latter will be instantly inflamed, breaking out with a fort of explosion, and will continue to burn until the oil is in great measure consumed.

Besides the use of their light, the flames of candles, and especially of lamps, are often used for the sake of the uniform heat which they give; and when no very great degree of heat is wanted, the use of such flames must be allowed to be incomparably more commodious, and more economical than a common fire. The enameller, the mineralogist, and the philosophical instrument makers, make great use of the heat of candles and lamps, the flames of which they frequently urge by means of the blow-pipe. An Argand lamp, especially when charged with spirit of wine, (for which purpose, however, the lamp must be made in a particular manner,) instead of oil, forms a pretty powerful furnace for small dilatations, decoctions, &c., but even the flame of a single common lamp is sufficient for a great variety of delicate purposes.

The word flame, besides its true meaning, which we have already explained, and which denotes the combustion of a volatile combustible body attended with the emission of heat and light, has often been indiscriminately applied to every kind of luminous appearance, provided its light had a pretty evident degree of intensity. Thus all phosphorescent bodies, electrical light, northern lights, &c., have been called flames by a variety of writers. Certain phenomena really have much the appearance of true flames; yet their real nature has not been sufficiently investigated. Thus the ignis fatuus, or Jack-a-lantern, is supposed to be nothing more than phosphorated hydrogen, which being extricated from certain materials in particular places, comes out of the ground, and burns on the surface of it; for it is a property of that gas to take fire of itself; the moment it comes in contact with the air, it burns. The nature of those appearances in the sky, which have been called flames, is mostly unknown to us. See Meteors, and Ignis fatuus.

By some authors, flame is defined to be light emitted from fire; by others, who have followed Newton, flame is said to be a vapour heated red-hot; for Newton in his Optics says, "Is not a flame a vapour, fume, or exhalation heated red-hot, that is, so hot as to shine? For bodies do not flame without emitting a copious fume, and this fume burns in the flame."

With respect to the first definition, we imagine that the preceding part of the present article has clearly shown that not all the light which is emitted from a fire is flame; and such for instance is the light emitted from a red-hot cinder, or of a coal nearly exhausted of its gas. As for sir I. Newton's query, it may be fairly said, that the state of chemical knowledge at his time could not furnish him with better ideas respecting the nature of flame.

Flames, Vital, Flamma, or Flammula vitalis, a fine, warm, igneous subsance, suppos'd by many, both of the ancients and moderns, to reside in the hearts of animals, as necessary to life, or rather as that which constitutes life itself.

To the preservation of this flame they suppose air as necessary as it is to the preservation of common flame; and hence they ascribe the necessity of respiration to animal life.

Mr. Boyle, by experiments in an exhausted receiver, found that the vital flame of animals, if life may be so called, adheres or outflashes the flame of spirit of wine, or of a wax or tallow candle, &c. Some animals would remain alive and well in vacuo for three or four minutes, whereas no common flame would last there one minute. The light of the glow-worms, he found, would not chiefly be destroyed by exhausting the air, and retrieved again upon its re-admission. Dr. Quincy could find nothing more in the notion of vital flame than the natural warmth, which is the effect of a circulating blood, and which is always as its velocity. See Animal Heat.

Flameel, or Flamel, Bertholet, in Biography, a painter of historical subjects, born at Liege in 1614. He began his studies in Flanders, but at the age of 24, he went into Italy to cultivate his talents by a view of the works of the renowned painters of that country. He took up his residence in Rome, there copying the best works of the great masters. He soon acquired a reputation which recommended him to the court of Florence, to which the grand duke invited him, and there employed him in several works, the execution of which acquired for him the estimation of that prince, and the applause of the public. In returning from hence homewards, after an absence of nine years, he went to Paris, and there painted, in the cupola of the church of the bare-footed Carmelites, Elijah ascending to heaven, and Elisha below endeavouring to catch the falling mantle of the prophet, thus miraculously borne from the earth.

At Liege he was received with great warmth, and to confirm the high opinion which his countrymen had conceived of his merit, he painted a crucifixion for the collegiate church of St. John, in which he introduced a great number of figures with great propriety and perspicacity. He also painted, in St. Paul's church, the conversion of that saint. And in the cathedral of the city another picture, representing the resurrection of Lazarus.

The chief of his life is a melancholy instance of the frail tenure on which man holds either his mental or bodily capacities. Notwithstanding that wealth, reputation, and fame attended him, he fell, unaccountably, into melancholy, and dejection of spirits, which incessantly oppressed him, till ultimately he funk under it. It was by many supposed to be owing to poison given him by an intimate friend named Brinivilliers, but there is no proof of that supposition being true. He died in 1675, aged 61.

By his residence in Rome, he adopted the taste of design of that school, being careful in his selection of objects, and correct in the representation of them. He introduced into his pictures a great deal of architecture, in which he was a proficient; he had great knowledge also of antiquities, and was careful in observing the costume; these, united with a lively imagination, render his works very interesting.

Flamen, among the ancient Romans, was a priest or minister of sacrificers.

There were as many kinds of flamen at Rome as there were gods who had priests and sacrificers offered them. Romulus and Numa, at first, only instituted three: one for Jupiter, called flamen Diator; another for Mars, called
The FLAMEN MARITALLVS; and a third for Romulus or Quirinus, called FLAMEN QUIRINALIS. Plutarch and Dionysius Halicarnassianus maintain, that Numa created only the first, in honour of Romulus; but Livy affirme, that Romulus had instituted only the first, and that the two others were added by Numa; and Varro speaks in the plural number of the flamines instituted by Numa. In after-times two more were added, which made the number of flamines fifteen.

The three first were taken from among the patricians, and were held of a rank and distinction superior to the rest. They were called greater flamines, flamines majoris, in contradistinction to the other twelve, who were chosen from among the plebeians, and were therefore called lesser flamines, flamines minores. The flamens Dialis, or of Jupiter, was the first instituted, and held in the greatest repute. He bore a peculiar ornament on his head, called albagalerus, which was made of the skin of a white victim sacrificed to Jupiter.

One of these priests revived an ancient pretention to a seat in the senate in right of his office, which, by the indulgence of his predecessors, had not been claimed or enjoyed for many generations. The pretor rejected his claim, nor would suffer him to sit in that assembly; but upon his appeal to the tribunes of the people, that is, to the people, his right was confirmed, and he was allowed to take his place as a senator. Liv. xxvii. 6. Middlet. of Rom. Sen. P. 40.

The cap worn by the priest was called flamum or apex. It was made of a fleece, skin, with the wool on; to which was fastened a little branch of an olive-tree. That of the flamens of Jupiter ended in a point called tutulus. It was tied under the chin with strings; but in the summer-time it was only a woolen thread tied round the head, it being prohibited them ever to appear quite bare-headed. And hence, according to Tullius, came their denomination of flamai, viz. from flamem or filum, thread.

Though the flamines bore one common appellation, yet did not they constitute any company or college. Each god had his several sacrifices, feasts, and ceremonies a-part; nor had one flamens any relation to another, only they were all subordinate to the pontifex maximus. Anius Gallus affirms, that they were created by the people in the comitia curiata; but the pontifex maximus afterwards consecrated them. Their priesthood, called flammatius, was perpetual, though on some occasions they might be deposed.

The names of the several flamines are as follow: the three great flamines, as already observed, were the flamens Dialis, flamens Martialis, and flamens Quirinalis; the twelve lesser were the flamens Carmentalis, or priest of the goddess Carmenta, mentioned by Cicero in his Brutus; flamens Faber, or priest of the god Falerus, a name whose origin, Varro olorwes, is not known; flamens Florialis, or of the goddess Flora; flamens Furialis, whose etymology is not known; flamens Ilevicalis; flamens Lucinaris; flamens Palatilis, whom some moderns will have to be the priest of the goddesses that presided over the patuam, though Varro owns himself at a loss for its original; flamens Pomonalis, or of Pomona, goddess of fruits; flamens Virbius, or of the god Virbius, whom some take for the same with Hippolytus; flamens Vulcanales, or of Vulcan; and flamens Volturinalis, or of the god Volturinus. Some authors also speak of the flamens Hadrianus, or priest of Hadrian; flamens Iulii Cesaris; of Julius Cesar; and flamens Auguiulais; and Commodus likewise had a flamens created under the title of flamens Herculanens Commodianus.

They had also their flavia or flaminices, who were wives of the flamines, or the priestesses of the deities. In an ancient marble, quoted by Gruter, p. cccclx. n. 9, the word flavia is used for priestesses; and in the same author, p. cccviii. n. 3, the priestesses of the goddesses Peronia is called flamifera, that is, flavia, or flapinica. The flavia bore the flamens ornament on her head with the flamens. She had also the same form of office with her husband, as flavinae Dialis, Martialis, &c.

FLAMETTE, in Conchology, a name given by the French writers to a species of chama or shell-fish of the bilva kind, with its shells always more or less open; this species is as hot as pepper to the taste.

FLAMINGO, in Ornithology. See Phoenicopterus ruber.

FLAMINIAN WAYS, one of the Roman ways, which, as it is corrected from the Itineraries and best modern maps by d'Anville, may be thus slated: Rome to Narri, 51 Roman miles; Terini, 57; Spoleto, 75; Foligno, 88; Nocera, 103; Cagli, 143; Intericia, 159; Possobromone, 169; Fano, 176; Pelaro, 184; Rimini, 268; about 189 English miles.

FLAMINIO, Marcantonio, in Biography, was the son of a man of letters, and born at Serravalle in 1498. He was educated with great care by his father, and when he was about fifteen years of age, he was introduced to pope Leo X., who received him very graciously, and in order to put his talents to the trial, caused the youth to dispute on certain questions in the presence of many cardinals, when he acquitted himself so well as to excite the surprise and admiration of all who heard him. His success induced his father to leave him to pursue his own fortune. The young man went to Naples, and from thence to Urbino, and in both places he had favourable opportunities of exhibiting the great power with which he was gifted. His father, dreading the influence of flattery, removed him to Bologna, to the pursuit of severer studies. In 1523, he revisited Rome, and from thence he went to Genoa, and was elected one of the academy. After this he passed into the service of Giberti, with whom he resided at Padua, and then, for some years, at Verona. His patron presented him with a farm situated on the back of Lago di Garda, where he spent much of his leisure time, and wrote a Latin paraphrase of Aristotle's Metaphysics, which was printed at Basle in the year 1557. In the following year, being in an ill state of health, he went to Naples, in which city he remained till 1551. Here his health was perfectly restored, and here, by the conversation which he had with some favourite of the Reformation, he was himself almost a convert. On his return from Naples he spent some time at Viterbo with cardinal Pole, who took great pains to restore him to the orthodoxy faith. In 1543, he was at Trent with the cardinal, and was after this offered the high post of secretary to the council of legates, which he declined. He was, however, the constant attendant and friend of cardinal Pole, and greatly beloved by many other cardinals and great men of his time. After a tedious illness he died at the house of his patron in 1550. His death was universally lamented, and his contemporaries are lavish in their praises, as well for the goodness of his disposition and his Christian virtues, as the depth of his erudition and the elegance of his genius. "His works," says his biographer, "appear to be dictated not by the understanding but by the heart." His poems rank him with the best poets of the Latin school. Of these, some in his early youth partake of the licence of the times, but the admonitions of his father and the febirdity of his own disposition called him to
to more serious strains. The greater part of the "Carmina quinque illustrium poetarum" consists of the works of Flaminio. His elegant poetical paraphrases of thirty psalms, published a few years before his death, and his Italian letters, are very highly esteemed. Some years after his decease his orthodoxy was suspected, his works prohibited, and it was intended to dig up his body for the purpose of committing it to the flames; but wiser and more deliberate councils determined otherwise. Moretti.

FLAMINUS, or FLAMININUS, Titus Quinctius, an eminent Roman, was born about the year 229 before Christ. He was brought up to the practice of arms, and acquired himself so well in several things which he undertook, that he was in early life appointed to the command of important expeditions. At the age of 30 he was candidate for the consulship, and was chosen though he had not served any of the inferior and preparatory offices in the state. He obtained, by lot, the conduct of the war in Macedonia; and performed, in various parts of Greece, many exploits recorded in history, till at length he treated with Philip, and made a peace on condition that the king should withdraw all his troops from the Greek towns. Commissioners were sent from Rome to affix Flaminus in disapproving of his conquests: these wished Roman garrisons to be kept at Corinth and other places, regarded then as the keys of the country, but the conqueror persuaded them to content to the full and complete liberation of Greece from foreign dominion. The decree was proclaimed during the Ithomian games. A vast multitude assembled from all parts, uncertain of their future fate, and filled with the utmost anxiety for themselves and their country. Silence was proclaimed by the found of a trumpet, and a herald advanced into the middle of the arena, where, in the name of the Roman people and of the proconsul Flaminus, he declared by name all those cities and states of Greece free which had been possessed by Philip. The proclamation was repeated, and the people, as with one voice, rent the skies with their shouts: so tremendous was the noise, that the birds were said to have been struck to the ground by the concussion of the air, and Flaminus himself was in danger of suffocation from the people who rushed upon him to kiss his hand in gratitude for his kindness. To him it was a glorious day; but the Romans refused to ratify the decree, and in a short time they dictated what terms they chose to the Greek republics, which now were declared free by Flaminus. The confiding left Greece with many tokens of gratitude from the people, but with none which he so highly prized as a present of 1200 Romans made captive in the war with Hannibal, who had been sold for slaves in the Greek states, and whom the Achaeans had carefully collected and redeemed, in order to send back with him. In the habits of manumitted slaves those men followed the chariot of their benefactor at the splendid triumph granted him on his return. Flaminus was afterwards long kept as a resident in Greece; the attachment of the nation to him, and his accurate knowledge of the views and interests of the several states, rendering him very useful as a negotiator. About the year 190 B.C. he was created cenfo at Rome, after which he was employed as an ambassador to Prussia, king of Bithynia, whom he persuaded to violate the laws of hospitality in delivering up Hannibal, who had taken refuge in his court, but the veteran soldiery prevented the treachery by taking poison. This is the last recorded transaction in which Flaminus engaged. Universal History. Plutarch.

FLAMMA Jovis, a name given by many writers to a plant of the elenmieris or virgin's bower kind, called by the Greek writers philocous.

FLAMMULA, or FLAMULA, under the Eastern Empire, was a kind of flag terminating in a point somewhat like a flame, serving as a mark or badge to distinguish the followers of the several companies, battalions, regiments, &c. In Greek it was called 6xamnus; it was sometimes placed on the caque, sometimes on the cuirafs, and sometimes at the end or tip of the pike, &c.

The emperor Maurice ordered that the flammeul of each division should be of a particular colour, to distinguish them from the other battalions or brigades.

They used to lay aside the flammeul before an engagement, lest it should prove an incumbrance. The cavalry laid also flammeul on their horses, to distinguish the troops they belonged to.

FLAMMULA, in Botany, a name given by some authors to a particular species of the crow-foot, commonly called the ranunculus flammeus.

FLAMMULA Auri, in Natural History, a name given by Dr. Woodward, and others, to those small pieces of gold found among the sands of rivers in some places. They are sometimes found in roundish pieces, but more usually in their shining flakes, whence the name flammeul seems to have been given them, as being very bright and glossy. This form of gold is pure and malleable, and loses scarcely any part of its weight in fusion.

The gold dust, as it is called, which is brought from Guiney, is much of this kind; its particles are usually very small, though sometimes lumps of the size of a pea or hordeon bean are found, and sometimes masses of an irregular figure of three or four ounces weight: but these lose the name of flammeul when they become so thick and solid, and so large, and are called by the merchants rock-gold.


FLAMSTEED, John, in Biography, an eminent English astronomer, was born at Denby, in Derbyshire, in the year 1646. He received his classical education at the free school at Derby, and it was intended that he should pursue his studies at the university, but a very severe illness at the age of 14, when he had attained the highest place in the school, rendered it necessary for his friends to change their original plan with regard to his future pursuits. Soon after he had quitted the grammar school he met with Sampson's astrologer's work, intitled "Diurnals," which he read with delight, and some parts of which he immediately translated. He now sought for other treatises connected with the same subject, among which was Street's "Astronomia Carolina," from this he learned the method of calculating eclipses and the places of the planets. In 1669, having calculated an eclipse of the sun, that was omitted in the ephemeris for the following year, he sent this, with other astronomical speculations, to lord Bruncker, president of the Royal Society, who laid them before that learned body, by whom they were greatly approved. From this period he kept up a correspondence on literary and scientific subjects with many of the most learned men of his time. In 1670, his father made him an offer of taking a journey to London, that he might become personally known to his ingenious and learned correspondents, which he gladly accepted. He was now introduced to Mrs. Celli, Mr. Oldenburg, and to Jonas Moore, the latter of whom became a most valuable friend and patron to Mr. Flamstead. On his return he passed through Cambridge, visited Dr. Barrow, Mr. Hooke, Newton, and other learned men; and entered himself a student of Jesus college. Mr. Flam-
FLA

flood, applying himself most vigorously to the study of
astronomy, wrote in the year 1673 a treatise on the true
and apparent diameters of all the planets, which Sir Isaac
Newton made use of in the 4th book of his Principia. He
wrote also on other subjects, as the tides, which were
more popular and adapted to practical uses, and of which
one was presented to the king. To whom, likewise, by
means of his friend Sir Jonas Moore, he presented a pair
of barometers, with directions for their use. These were new
instruments at that period, and excited the attention of
the monarch and of the nobility, to whose patronage he had
been carnesly recommended. Mr. Flamsteed now deter-
mine to take orders, and was ordained in 1673 by bishop
Gunning; but he did not obtain any preferment in the
church for several years. Sir Jonas, however, prevailed
on the king to erect a new office for him, viz. that of
astronomer-royal, and the foundation of the Royal Obser-
vatory at Greenwich was built and named after him, Flam-
steed House. In 1681, his work intitled "The Doctrine
of the Sphere," was published by Sir Jonas Moore in his
"System of Mathematics;" and, in 1684, he was presented
with the living of Dursford in Surrey, the only instance
of preferment to which he attained, notwithstanding the high
estimation in which he was held by persons of the first rank
among his contemporaries. He now maintained a close and
constant correspondence with the immortal Newton, with
Halley, and all the great men of that illustrious age, and
among his foreign correspondents was the celebrated
Caffini, who was held in the highest respect by him.
To any and all his friends he was ever ready to give assistance
in facilitating their studies, and he took pleasure in contrib-
uting, by his sagacious and honest, to the extension of their
reputation. He spent the remainder of his life in pro-
fecuting his labours in the improvement of astronomy with
unwearied exertion and activity, and died at the end of the
year 1719, at the age of 73. He published many small
tractes, a vast number of papers in the Philosophical Trans-
actions, in almost every volume from the fourth to the
twenty-ninth. But his great work, and that on which his
celebrity depends, is intitled "Historia Cælestis Britannica;
" in three volumes. The first of which contains the ob-
ervations of Mr. Gascoigne, taken at Middleton in York-
shire; and likewise those made by Mr. Flamsteed at Derby,
between the years 1638 and 1643, with tables, &c.
done at the Royal Observatory between the years 1675 and
1689.

The second volume contains his observations, made with
a capitol telescope, on the zenith distances of the fixed
stars, sun, moon, and planets, with their tranits over the
meridian; also notes and observations on the diameters of
the fun and moon, with their eclipses, and those of Jupi-
ter's satellites, between the years 1669 and 1719. The
third volume comprises a catalogue of the right ascensions,
polar distances, longitudes, and magnitudes of nearly 3000
fixed stars. The preface to this volume contains an account
of all the astronomical observations made before his time,
with a description of the instruments employed, and much
other curious and highly important matter. The printing
of this noble work was not finished at the time of our
author's death, and the care necessary to its completion de-
volved on Mr. James Hodgson, by whom it was published
in the year 1725. Few men posseved more zeal and appli-
cation in the pursuit of scientifick knowledge than the first
astronomer-royal; and scarcely any man ever attained to
higher respect among his contemporaries. In common life
he was free, easy of access, and pleased with the company

of those who with scientifick research could unite their share

FLANCH, Flanque, or Flaque, in Heraldry, an
ordinary form'd by an arched line, which begins at the
corners of the chief, and ends in the base of the escut-
cheon.

He beareth ermin two flanches vert. Flanches are al-
ways borne by pairs.

Leigh makes flanque and flaque two distinct bearings,
whereof the former is more beant than the latter; but
Gibbon judiciously makes them but one, which he calls
flaque.

FLANCONNADE, in Fencing, is the action of drop-
ping the point of your sword under your adversary's hilt,
in seizing with force the feele or foible of his blade; which,
binding without quitting it, form the parade in octave, and
then throw in your thrust. This thrill is seldom practised,
except on favourable occasions, when the adversary holds
his sword low on guard.

FLANDERS, in Geography, a maritime province of
the Netherlands, was formerly very considerable, and
bounded on the north by the mouth of the Scheldt and the
German ocean, on the east by Brabant and Hainaut, on the south
by Hainaut and a part of France, formerly called Artois and
Picardy, and on the west by the English channel and Artois.
Its greatest length is estimated at about 60 miles, and its
breadth about 50. It contained 30 cities or walled towns, a
great number of market towns, 1544 villages, and several
religious houses. Flanders was generally divided into
Austrian, French, and Dutch Flanders. The first extended
from the sea to the Dender, being bounded on the north by
Dutch Flanders, on the east by Brabant, on the south by
French Flanders, and on the west by the channel, and con-
verted several considerable cities, as Ghent, Bruges, Ostend,
Oudenard, Dendermond, Nieuport, Furnes, Dixmude,
Courtray, Ypres, Tournay, &c. &c. French Flanders con-
tained Lille, Dunkirk, Gravelines, Cassel, &c. &c. The
third, or Dutch Flanders, bordering on the Scheldt, towards
its mouth, contains the towns of Hull, Axel, Bouchout,
Assenede, Ardenburg, &c.; and this seems to be the only
part which retains the name of Flanders. By the treaty
of Formio, A.D. 1797, the whole of Austrian Flanders was
annexed to the dominions of France, and converted into the
departments of the Lys and the Scheldt. The climate of
this country is temperate and balustrous; the soil in gen-
eral is fertile and fit for tillage; and in some places it is
uncommonly fertile. The land produces all kinds of grain
and vegetables. This is a very considerable commodity, and
has greatly contributed to the wealth of the country. The
patter grounds are excellent, and furnish a valuable breed
of cattle, which yield rich cheese and butter. The breed of
horses and sheep is also considerable. The Flemings were at
one time the principal manufacturers of Europe; and by
them the English were taught the art of weaving, and pro-
ably that of agriculture. Their trade was also very ex-
tensive. The most beautiful table linen is still the manufac-
ture of this country, and its lace is superior to every other.
The principal rivers are the Scheldt and the Lys.

FLANDERS, a town of New Jersey; 23 miles N.N.W.
of New Brunswick.

FLANEL, or Flannel, a kind of flight, loofe, woollen
stuff, not quilted, but very warm, compofed of a woof and
warp, and woven on a loom with two treadles, alter the man-
ner of bays. As flannel is a bad conductor of heat, it must
evidently form an useful garment in cold weather; its un-
fitness for conducting heat is obvious from its lax structure;
for the fibres of wool touch each other slightly, and therefore the heat moves slowly through the interfaces, which, being filled with air, afford little affinity in carrying it off. Count Rumford made many experiments on this subject; whence it should seem, that though linen, which readily receives humidity from the atmosphere, appears to possess a greater degree of attraction with respect to water than other substances; yet those substances which receive water in its unelastic form with the greatest ease, or are most easily moistened, do not, in all cases, attract the moisture of the atmosphere with the greatest avidity. "Perhaps," says he, the apparent dampness of linen to the touch arises more from the cafe with which that substance parts with the water it contains, than from the quantity of water it actually holds; in the same manner as a body appears hot to the touch in consequence of its parting freely with its heat, while another body, which is really at the same temperature, but which withholds its heat with great obstinacy, affects the sense of feeling much less violently. It is well known that woollen clothes, such as flannels, &c. worn next the skin, greatly promote inelastic perspiration. May not this arise principally from the strong attraction which subsists between wool and the watery vapour which is continually suffusing from the human body? That it does not depend entirely on the warmth of that covering is clear; for the same degree of warmth produced by wearing more clothing of a different kind does not produce the same effect. The perspiration of the human body being absorbed by a covering of flannel, it is immediately distributed through the whole thickness of that substance, and by that means exposed by a very large surface to be carried off by the atmosphere; and the loss of this watery vapour which the flannel abounds on the one side, by evaporation, being immediately restored to the other, in consequence of the strong attraction between the flannel and this vapour, the pores of the skin are difencumbered, and they are continually surrounded by a dry and exhilarating atmosphere." He expresses his surprise that the custom of wearing flannel next the skin should not have prevailed more universally. He is confident it would prevent a number of disputes; and he thinks there is no greater luxury than the comfortable sensation which arises from wearing it, especially after one is a little accustomcd to it. "It is a mistaken notion," says he, "that it is too warm a clothing for summer. I have worn it in the hottest climates, and at all seasons of the year; and never found the least inconvenience from it. It is the warm bath of perspiration confined by a linen shirt, wet with sweat, which renders the summer heat of southern climates far insupportable; but flannel promotes perspiration, and favours its evaporation; and evaporation, as is well known, produces positive cold."

It has been observed that new flannel, after some time wearing, acquires the property of shining in the dark, but loses it on being washed. Phil. Trans. No. 483. § 7. See Electricity.

FLANK, or FLANC, in the Manege, is applied to the sides of a horse's buttocks, &c.

In a strict sense, the flanks of a horse are the extremities of the belly, where the ribs are wanting, and are below the loins.

The flanks of a horse should be full, and at the top of each a feather. The distance between the last rib and haunch bone, which is properly the flank, should be short, which they term well coupled, such horses being most hardy, and fit to endure labour.

A horse is said to have no flank if the last of the short ribs be at a considerable distance from the haunch bone; as also when his ribs are too much straightened in their compass.

FLANK of an Army, in Military Language, is the exterior point, or part, towards either end of every line, the same as the terminations of the files of a battalion or company are their flanks respectively. It has ever been held among military men of the first importance to preserve the integrity of the flanks, by supporting them in the most effectual manner against every assault. This, however, is not always practicable when opposed to a superior force, unless by the aid of such a formation of the line as may render any such superiority, not extending to more than a fifth or sixth, of less avail than it would obviously be, were the two armies to be drawn up parallel to each other: in such case the greater force must cover a greater extent of ground, and thus be enabled to "out-flank" its opponent. When such an opportunity may offer, it will generally be seen, that while the residue are left upon equal terms, man to man, and gun to gun, the excess of numbers is devoted to such a powerful charge on one flank as should seem to be irreparable. Thus, the attack is either made in column, usually concealed by a body of cavalry until the moment of assault, or an angle is formed in advance, which is called "offering a flank," for the purpose of beating in the flank by an oblique or a circuitous approach to, not only its extremity, but even towards its rear. In such case the lighter body necessarily avails itself of that simple evolution termed "refusing a flank," by throwing back a portion of its extremity in an angular direction, so as to become parallel with the flank "offered" by the stronger party. The first figure, Tactics, Plate II. shews the attack made in column, by an army A, superior on one flank, together with the deploy of the cavalry B, that covered or fixed the manoeuvre towards the flank of the line D, with the view to "turn" it; that is, to beat it in towards the centre, and thereby to throw the whole into confusion. The dotted lines at E shew the change made from D, for the purpose of "refusing a flank," and of thus bringing a column to oppose the charge intended to be made. The village G serves to "cover the flank" from the cavalry that deployed for its attack.

In fig. 2. the line H I K is superior to the line L M N; the former "offers the flank" I O, which the latter renders unavailing (at least so far as lesser can render greater forces) by "refusing a flank" in the direction M P, parallel to I O. This, considered mathematically, will be found sufficient; because, under the supposition that the lines L M and M P are chords of arcs having their common centre somewhere in their rear, it is evident that the parallels H I and I O, being, of course, concentric therewith, but exteriorly situated, must occupy a greater extent, and yet, in effect, not outflank their inner parallels. We do not mean to calculate that the superior force is not still the superior force, but only to shew how the lighter body can, by a judicious arrangement, either render that superiority less availing, or, perhaps, induce to a break near the centre, whereby an opening may offer for the cavalry of the weaker army to dash in so as to divide the enemy's line, and to facilitate the defeat of at least one wing.

FLANK of a Balloon, in Fortification, is that part which forms an angle, generally of about 110°, or in flat baloons of 130°, with the contiguous face. The flank of a balloon is generally intended to defend the face of the other balloon standing at the further extremity of the same curtain; therefore usually stands at right angles, or nearly so, therewith: hence it is necessary to shew the flanks of the contiguous baloons, both right and left, before the flanked angle.
F L A

angle of that battalion flanking between them, though perfectly braced, can with propriety be formed.

Flank, Lawn, covered, or retired, is the platform of the cememt which lies hid in the battalion; otherwise called the orillon.

Flank Fichout, is that from whence a cannon playing, fireth bullets directly in the face of the opposite battalion.

Flank Rear, or right, is the point from whence the line of defence begins, from the conjunction of which with the curtain, the first only reft the face of the next battalion, which happens when the face cannot be discovered but from the flank alone.

Flanks, Simple, are lines going from the angle of the shoulder to the curtain, whole chief office is for the defence of the moat and place.

Flank walls, in Engineering, are the same with wings or return walls of a lock or bridge. See CAVAL.

FLANKED, Flanquis, is used by the French heralds to express our party per faltier; that is, when the field is divided into four parts, after the manner of an X.

Though Colombiure uses the term in another sense, which appears more natural, viz., for the taking of flankers or rounding fections out of the sides of the enclofes; the firt from the angles of it, the latter in straight lines, forming an angle at the fets, without making any faltier.

Flanked Angle, in fortification, is the angle formed by the two faces of the battalion, and which of courfe forms the point of the battalion.

Flanked Line of Defence. See Angle and Line of Defence.

Flanked Tenaille, is called also tenaille.

FLANKING, in the general, is the act of discovering and firing upon the side of a place, body, battalion, &c.

To flank a place, is to dispose a place or other work in such a manner as that there shall be no part of the place but what may be played on, both in front and rear.

Any fortification that has no defence but just right forwards is faulty; and to render it complete, one part ought to be made to flank the other. Hence the curtain is always the strongest part of any place, because it is flanked at each end.

Battalions also are faid to be flanked by the wings of the cavalry. A house is sometimes faid to be flanked with two pavilions, or two galleries, meaning it has a gallery, &c. on each fide.

Flanking Angle. See Angle.

Flanking Batteries, are fuch as defend each other mutu- rally, such as the face of a ravine, and the contiguous face of its linette; which fland nearly at right angles, and form a re-entering angle. In general, the term is applied only to that battery whose fire, when direct, grazes the front of the work it is to defend, as fhewn above in defcribing the flank of a battalion; but in that infatuation the defecnes do not afford reciprocal support. Works that are not flanked by others can be ftrong only in confequence of natural advantages. See Field Fortification, and Construction, Military.

Flanking Line of Defence. See Line of Defence.

FLANNAN ISLANDS, in Geography, or Seven Hunters, a group of small uninhabited islands in the North Sea, about 17 miles N.W. from the island of Lewis. They yield good paffure for sheep. On the largel are the ruins of a chapel dedicated to St. Flannan. N. lat. 58° 26'. W. long. 7° 25'.

FLANSKER, a small island on the E. side of the gulf of Bothnia. N. lat. 63° 24'. E. long. 21° 26'.

FLASHERS, in Engineering, are a kind of strings erected upon navigable rivers to raise the water upon any shoals therein, while the vessels or craft are passing. See CANAL.

FLASK, in the Artillery. See Powder flask.

Flats, Flats, a bearing more properly called flanque or flank.

FLASKET, in Geography, an island near the coast of Norway, 88 miles S.W. of Drammen.

FLAT, is a character in Music, expressed by a small b, of which the effect is lowering the note to which it is added a semitone minor. Guido d'Arezzo having given names to six sounds of the octave of which he constituted his celebrated hexachord, left the seventh of the natural scale unprovided with any other appellation than the letter b, which is wanted in the male hexachord, when the same sound becomes the fourth of the key of F. (See Hexachords and Musical Characters.) Flats on keyd instruments are the nominal half notes below, that is, on the left hand of the natural notes, as sharps are on the right hand. There are two ways of using flats, the one accidental, which has no effect beyond the angle bar in which it occurs; the other is the flat or flats placed at the clef, in the beginning of a movement which affect all the notes on the same line or space throughout a movement, unless accidentally discharged by a natural, &c. The placing the flats at the clef is not arbitrary, as the first necessarily is on B, the second on E, the fourth above or 5th below, &c. in the following order:

\[ \text{Bb} \quad \text{Eb} \quad \text{Ab} \quad \text{Db} \quad \text{Gb} \]

For these five flats upon keyd instruments, there are five short keys; flats, however, sometimes occur in C and G, but for these the two long keys are obliged to be used of B and E natural, the two half notes below C and F natural. If it is necessary in practice to lower any found already flat at the clef a semitone, it is done by double flats; as B is Bbb, E double flat D natural, &c. See Scales, Characters, and Transpositions.

Flat Third. See Minor Third.

Flat Key. See Minor Third.

Flat, Double, is a term used where a note already flat is required to be again depressed by a half-note, and is marked thus Bbb or Bb; the quantity or exact depressing effect of which will only be constant in the equal temperament, and in all other systems of temperament will partake of all the uncertainty which we have shewn to prevail with regard to B. See Flat.

Flats are a kind of additional or half-notes contrived, &c. together with sharps, to remedy the defects of musical instruments.

The natural scale of music being limited to fixed sounds, and adjusted to an instrument, the instrument will be found defective in several points; as particularly, in that we can only proceed from any note by one particular order of degrees; that for this reason we cannot find any interval required from any note or letter upwards or downwards; and that a long may be fo contrived, as that if it be begun by any particular note or letter, all the intervals or other notes shall be justly found on the instrument, or in the fixed series; yet where the song begun with any other note, we could not proceed.

To remove or supply this defect, musicians have recourse to a scale proceeding by twelve degrees; that is, thirteen notes, including the extremes, to an octave; which makes the instrument so perfect that there is but little
little to complain of. This, therefore, is the present
system of the scale for instruments, viz. between the ex-
tremes of every tone of the natural scale is put a note,
which divides it into two unequal parts, called 
semitones; and the whole may be called the semitone scale, contain-
ing twelve semitones between thirteen notes in the compass
of the octave.

Now, to preserve the diatonic series distinct, these in-
serted notes either take the name of the natural note next
below with a character called a sharp; or they take the
name of the natural note next above with a mark called
flat. Thus D flat signifies a semitone below the D na-
tural; and it is indifferent, in the main, whether the inserted
notes be accounted as a flat or a sharp.

The semitone series or scale is very exactly represented
by the keys of a pianoon; the forefoot range of keys be-
ing the natural notes, and keys behind, the artificial notes,
or the flats and sharps. The flat is denoted by the letter
b in the writing and printing of music, and denotes that the
note to which it is prefixed is to be lowered a half-note or semi-
tone, and of course made to coincide with the note imme-
diately below, in all such instruments as have but 22 intervals
in the octave; it must however, be observed, that except in the
Equal Temperament of the scale (which see), the flattening
effect of b is not always the same, but varies according
to the magnitude of the half-notes in each different system
of temperament or part of the same system, as observed
under Finger-key intervals.

Writers on the theory of music are by no means agreed
on the magnitude of the interval which they affix to a
flat. Dr. Robert Smith (Harmonics, p. 160.) defines it to
mean the minor limma of his different tempered sylluns
(which see). Mr. Maxwell, (Essay on Tuning, p. 5.1.) fixes
it to his major limma, which has a ratio of $\frac{\sqrt{5}-1}{2} = 47 \frac{7}{12}$
$+ 4 m$ and is the mediis Semitono (which see). Dr. Cal-
cott (Musical Grammar, p. 112.) defines it to mean his chro-
matic semitone, or the apotome which has a ratio of $\frac{\sqrt{2}}{2} \frac{448}{445}$
$= 58 \frac{4}{12} + 5 m$; in numerous other instances, we find
the flat defined to mean the limma whose ratio is $\frac{24}{25} \frac{24}{25}$
$= 46 \frac{4}{12} + 4 m$. If we examine the MSS. of Mr. Overend,
we find the flat fourth of Tuttini and himself, and also
what he calls the greater of the flat fourths and flat eighths,
and each of them depressed below their natural intervals
by the minor semitone, whose ratio is $\frac{24}{25}$ $= 36 \frac{4}{12} + 3 m$.

See Sharp.

Flat, in Sea Language, denotes a level ground lying at
a small depth under the surface of the sea, and is also called
a flat or shallow.

Flat Bottom, in Fortification. See BASTION.

Flat-bottomed Boats are such as are made to swim in
shallow water, and to carry a great number of troops, ar-
illery, ammunition, &c. They are constructed with a
twelve-pounder, bow-chafe, and an eighteen-pounder, stern-
chafe; their keel is from ninety to one hundred feet, and
from twelve to twenty-four feet beam: they have one main,
a large square main-fall, and a jib-fall, are rowed by eighteen
or twenty oars, and can carry four hundred men each.
The gun takes up one bow, and a bridge the other, over
which the troops are to march. Those that carry heres
have the fore-part of the boat made when open to
the men to mount and ride over a bridge. See Boat.

Flat-bottomed Boat. See Boat.

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FLAT, or FLATTENED. See COMPRessed.

FLATTENED Fisss, in Natural History, are such mineral substancess, organic remains in particular, as seem to have suffered a compression or flattening, since their first deposit in the strata; Mr. W. Martin observes (Outlines, p. 72.) that such compressed, or flattened form of relicka, is often the consequence of the mode in which the mineral change has been brought about, and not the effect of a similar structure in the original. Some relicka retain the form only of one side, or of one half, of the organized body represented; while others present the whole of the external or internal organic fabric, according to the manner in which the mineral matter has been united to the animal or vegetable figure. See Compressed Fissi.

FLATTER, or FLATTENFR. See COining.

FLATLYE, Cape, in Geography, a cape on the N.W. coast of North America, so called by captain Cook in his third Voyage (March 1778), because it presented an open bay, which flattened the navigators with this hope of a harbour, but disappointed them; the opening being closed by low land. It lies in N. lat. 48° 15'. E. long. 235° 3'. Over it is a round hill of moderate height; and the adjacent land is well covered with wood, and exhibited a very pleasant and fertile appearance. In this latitude geographers have placed the pretended free of Juan de Fuca. But our navigators saw nothing like it; nor, say they, is there the least probability that ever any such thing existed.—Allo, a cape on the N.E. coast of New Holland. It lies in S. lat. 14° 56'. W. long. 214° 23', and is a lofty promontory, making next the sea two hills, which have a third behind them, with low sandy ground on each side; but it may be better known by three islands out at sea; the largest, and northern most, lying about five leagues from the cape, in the direction of N.N.E. This is supposed to be the same with that which capt. Dixon called Cap e Cox.

FLATTY, or FLATTENING. See COining.

FLATTENING-coarse, among Brick-makers. See BRICK.

FLATTENING—mille. See MILL AND Gold-stein.

FLATTS, signify the fame with dirt-bottoms or floats, which are rectangular flat-bottomed and very shallow vessels, used on the Mersey and other navigable rivers, for moving Flast to repair the banks of a canal, and other purposes; in some places the ordinary trading boats are so called.

FLATULENCE, in Medicine, from the Latin, status, a puff, or blast of wind, signifies the generation and discharge of air, or gas, in and from the human body, especially in the flomach and intestines.

There are only two sources from which air can be generated in the passages just mentioned; namely, their contents, and the blood-vessels which secrete other fluids into them. The first of these, the substancess contained in and passing through the alimentary canal, are the ordinary fources of stAtus: for although we know that in some animal structures, as in the air-bladder of fishes, the vessels appear to be adapted for the secretion of air; and although it is not improbable that, in some morbid conditions of the organs of the human body, the blood-vessels occasionally secrete air, as was formerly believed by Mr. John Hunter; yet, in general, we have a much more natural fulction of the problem, in the difengagement of air from the substancess taken for the purpose of nutriment. All animal and vegetable substancess difangage a considerable quantity of air in the course of their decomposition, whether by fermentation or putrefaction. It appears from the experience of Dr. Hales, that an apple, and many other kinds of alimen, give out six hundred times their own bulk of an elastic gas during fermentation. But the procw of digestion, when well performed, prevents this fermentation from taking place; and the soluble power of the gastric juice converts the food into chyle without any difengagement of air. When, however, the digestive procw is imperfectly carried on, the alimen, and especially the vegetable part of it, is difposed to go into a partial fermentation, of which the difengagement of air is a necessary conquence. Flatulence, therefore, is not so much a disease in itself although generally considered to by those who are troubled with it, as a symptom of indigestion, or of a weakened condition of flomach; and hence, although a flatulent difension of this organ may be relieved by the means which we shall enumerate, it can only be entirely cured by restoring the strength of the flomach. See Dyspepsia, and Indigestion.

Flatulence occasions various feelings of displeasure, according to the part of the alimentary canal in which the wind is generated; or pent up. When it is copiously generated in the flomach, and does not pass easily or readily out at the upper orifice, to be difgarded by eructation, it produces all the difgarding conquences which are attendant on great difension of that organ: in some instances great pain of the flomach is excited, either by the simple extension of the fibres, or by partial spasmic contractions; in others, especially in hysterical habits, the adjoining organs are considerably affected by the pressure of the diftended flomach; whereas great anxiety and oppression are felt in the chiel, from the impediment to the free motion of the lungs and of the heart; the respiration becomes laborious and dificult, with a sense of suffocation, and the heart intermits in its action, giving rise to intermission of the pulse, or is excited to violent palpitations. These symptoms are generally alleviated by the discharge of wind by eructation; this alleviation however, is only temporary; for the flates again accumulate and re-produces the same effets. The generation of air in the flomach, in lefs degrees, is an ordinary concomitant of indigestion; but it generally passes off readily. Some people, indeed, acquire a habit of voluntary eructation, which, however, is not healthy. For, as Dr. Darwin justly observes, "when people voluntarily eject the fixed air from their flomachs, the fermentation of the alimen goes on the faster; for floping the vessels which contain new wires, retards their fermentation, and opening them again accelerates it; hence where the digestion is impaired, and the flomach somewhat diftended with air, it is better to refrain than to encourage eructations, except the quantity makes it necessary." (Zoonomia, Clafs i. 3. 1.) It has been suggested, and we think not incorrectly, that in the repeated voluntary attempts to difpel wind from the flomach, which are often continued for some length of time, the atmospheric air is often actually flwatered, and the disagreeable fenstion of diffusion thus augmented.

When air passes from the lower orifice of the flomach into the intestines, or when, as is perhaps more common, it is generated from the fermentation or putrefactive changes of the alimentary matters in their course through the canal, other difgarding symptoms are produced. The flomach is filled with the fots from fermentation of an effe of neonferb, with a rumbling or gurgling noise in the belly, termed fomcrumus. This, however, is sometimes sufficently difgarding, especially from the drawing the attention of by-landers, and is not very uncommon in young women, about the age of puberty. "I attended a young lady about sixteen," says Dr. Darwin, "who was in other respects foble, whose bowels almost incessantly made a
As this noise never ceased a minute together for many hours in a day, it could not be produced by the uniform defeat of water, and, absent of air through it, but there must have been alternately a retrograde movement of a part of the bowel, which must again have pulled up the water above the air; or which might raise a part of the bowel, in which the fluid was lodged, alternately above and below another portion of it, as might happen in some of the curvatures of the smaller intestines, the air in which might be moved backward and forward as the air-bubble in a glass level. (Loc. cit.)

The colic, which is occasioned by flatulence, (the stinkily colic, or colica flatulenta,) arises from partial collections of air, probably pent up by partial epiphanic frictions, especially in the colon, or great gut. The distensions, in such cases as Hoffmann has remarked, are most frequently obvious in the right or left hypochondrium (under the short ribs), on account of the curvature of the bowel in those parts, by which the more ready passage of its contents is impeded; and such dilatations, he adds, have been mistaken by persons ignorant of anatomy, for tumours of the spleen. Large and painful tumours are also sometimes observed, above the spine of the right ilium, which are augmented by flatulent food. Hoffmann affirms their seat to be the head of the colon, which is capacious and mucular for the purpose of propelling the faces upwards, and which has been occasionally seen so much dilated, as to push forward the integuments, with considerable pain, and to be in danger of being ruptured. The nature of such tumours may be learnt from the relief to the pain and diminution of the swelling, which follow the emission of flatus, or the copious discharge of a tenacious matter, by vomiting or by follow. A great dilatation of the colon occasions very similar dilating symptoms, to those which arise from dilatation of the stomach, from the pressure produced on the surrounding organs. Hoffmann observes, that pains in the loins, internuinion of the pulse, cedematous swellings of the feet, &c. originate often in flatulent dilatations of the bowels, compriing the great vessels and nerves. (Hoffmann, Med. Rational, sect. 1. cap. v. § 57.)

See COLIC.

Sometimes the whole abdomen is enlarged by the general dilatation of the bowels with air, accompanied by colicification. When this dilatation has been of some duration, a degree of paralysis of the muscular fibres of the intestines is produced, their power in expelling the wind is lost, and the integuments of the abdomen become tense, like a drum; the patient becomes emaciated and tabid. This distension is called Tympanites; which see.

For the relief of flatulence, the radical cure, as we have already observed, can only be effected by curing the debility of the stomach and bowels; a number of medicines have been devised, from a very early period of time, especially such as are comprehended under the appellation of Carminatives, (which see.) There are generally substances possessing strong sensible qualities, which render them instantaneous dilatant to the nervous system; and by suddenly exciting the muscular coat of the stomach to action, enable it to overcome the dilatation, and disperse the distending gas. The aromatic vegetables, containing much essential oil, such as juniper berries, the seeds of anise, caraway, and coriander, the roots of ginger and zedoary, and the waters distilled from these, are among the most esteemed carminatives. To these may be added other stimulant and antispasmodic medicines; such as affo-
tides, and other strong smelling gums; volatile alkali; opium, &c. &c. Warm fomentation externally to the region of the stomach has been recommended by Dr. Darwin, and other external remedies were employed by Dr. W. Bytt, especially frictions on the region of the stomach, with prepara-
ments composed of the warm oil, such as the expressed oil of nutmeg, oil of musk, roasted and added the caju of large piddles to the belly, made with the stimulating gums and gum-assin. He considered rather and opinion, however, as the most effectual remedies for flatulence. Dr. Darwin recommends "the cores of black pepper swallowed whole after dinner, that its effects may be slower and more per-
manent," in the scrobogut of young women. We have freer them suspended by any subidity, taken into the stomach, as a piece of dry biscuit, which, by the way, the late Dr. Buchan considered "one of the best car-
minative medicines," and Eommend in all complaints of the stomach, arising from flatulence and indigestion. These dilatations are often particularly troublesome when the stomach is nearly empty, and perhaps the operation of a bilious. taken at such times is merely that of relieving this temporary vacancy, which may other light almost would effect.

As the proper digestion of the food is much aided by a regular motion and discharge of the excretion, a portion of it downwards, wherever the bowels are confined, particular care should be taken to obviate this tardiness of their action, by conjointing stimulant laxatives with the def-
pellers of wind. Hence pills, consisting of aloes, calody, or rhubarb, combined with affostrica, ginger, &c. may be ad-
vantagously administered. To these means the general rem-
dies for indigestion should be added, as well those which strengthen the constitution at large, as those which give vigour to the stomach in particular; such as are especially the aromatic bitsters, preparations of feb, and exercise. And the diet should be selected from those materials which do not readily pafs into the viscous or acetic fermentation, and which are easy of digestion; hence greens, peas, beans, and other similar vegetable matters should be avoided, as well as liquors which are in a state of active fermentation, and consequently defueling caloric air; and particular attention should be paid to moderation in eating and drinking, so that the digestive powers may not be oppressed and over-
come.

For, as we have already observed, when speaking of DIB, excess in quantity is, in general, much more pro-
ductive of injury, than any unwholesome quality in the articles of food which we use.
1. F. capitata. Juss. MSS. Flowers in aggregate corymbose heads.—(Erbilia bidensis; Linn. Nov. Gen. 1:10. Wild.; Sp. Pl. v. 3. 1741. See Erbilia.—Eupatorioides falsches folio trinervi, flore luteo, vulgo Contrabibra; Feuill. Pl. de Peron & Chili, 18. t. 14.)—Native of Chili, where it was gathered by Feuillee, who mentions its affording a fine yellow dye, if boiled in common water; and subsequently by Mr. Menzies, to whom we are obliged for a specimen in ripe fruit. It has been cultivated in the royal garden at Paris, whence we received a specimen in flower by favour of M. de Jussieu, marked with his own specific name as above. This is precisely the same as the Erbilia bidensis of the Linnaean herbarium, whose native country was never before ascertained.—The root is fibrous, and appears to be annual. Stirn from one to two feet high, erect, straight, angular, inflated, smooth, often purplish, solid, leathery, with several opposite, straight, spreading, forked branches. Leaves opposite, flaked, spreading, lanceolate, acute, three-nerved, hairy, borne on a leafy base. Footstalks dilated at the base, and clasping the stem. Flowers terminal, yellow, numerous, in a fort of compound corymbus, very ill-drawn by Feuillee. The ultimate flarchs are each a fort of compressed racemis, on which the flowers are arranged alternately, in a spiked manner, with a bractea under each, and several small flarks combine to form a dense level-topped head. All the parts of the inflorescence and flower are smooth, except a few hairs now and then at the edges of the principal flarks. When in fruit, the whole assumes a pale hue, the calyx becomes gibbous, containing rarely more than one grey, slender, obovat, nearly ribbed seed. The inflorescence of this plant greatly resembles that of Valeriana Cornucopiae, and some others of the same genus.

2. F. spicata. Juss. MSS. Flowers in compound spikes. Gathered by the unfortunate Dombey in Peru; see Doms. One of his specimens was given us by M. de Jussieu, with the same name we have adopted, and a very fine one was found, without any mark. In the herbarium of the younger Linnaeus. This species has altogether the figure of Sp. Scallii, but the stem is flabelliform, with many round, or slightly angular, roughish, leafy and flowery branches. Leaves opposite, flaked, lanceolate, narrow, smooth above; with three ribs, which are rough beneath; and a few shallow dilant furacera. Spikes very numerous, opposite, lateral and terminal, with innumerable little, yellow, crowded, suffuse, bracteated flowers, whose calix-leaves are fringed, roughish and very obtuse. Flowers about three. Seed shaped like the leaf, but smaller, blackish, and with scarcely more than four angles or ribs. The flavour of the plant is slightly bitter and aromatic.

FLAVIA CASSARINDIS, in Ancient Geography, a province of Britain, which extended over the whole breadth of the island where it is broadest, from the Land's End in Cornwall, to the South Foreland in Kent; and was bounded on the S. by the English channel, on the N. by the Bristol channel, the Severn, and the Thames. It comprehended the countries of the Damnoni, Dumetriges, Belgo, Atrebatia, Regni, and Camiis, which are now Cornwall, Devonshire, Dorsetshire, Somersetshire, Hampshire, Wilts, Berkshire, Surrey, Suffolk, and Kent. This province was not first established, but the countries comprised in it made a part of the one province in Britain, from the time when they were subdued, to the reign of the emperor Severus. When that emperor divided the Roman territories in Britain into two provinces, these countries
made a part of the southern one, and so continued until Constantine the Great formed them into a distinct province, which was called Flavia Caesariensis, from Flavius, one of the names of that emperor. The other four provinces were Britannia Prima, Britannia Secunda, Maxima Caesariensis, and Valentia. Britannia Prima was probably so named because it contained some of the countries which first submitted to the Romans, in this island. This province was bounded on the south by the Thames, on the east by the British ocean, on the north by the Humber, and on the west by the Severn; and comprehended the countries of the Dobuni, Cattuvelianni, Trinobantes, Iceni, and Coritani; which are now Gloucestershire, Oxfordshire, Buckinghamshire, Bedfordshire, Hertfordshire, Middlesex, Essex, Suffolk, Norfolk, Cambridgeshire, Huntingdonshire, Northamptonshire, Leicestershire, Rutlandshire, Lincolnshire, Nottinghamshire, and Derbyshire.

Britannia Secunda perhaps received that name, when Severus divided the Roman dominions in Britain into two provinces, of which this was the second. It was bounded on the south by the Bristol Channel and the Severn, on the east by St. George’s Channel, on the north by the Irish sea, and on the west by Britannia Prima. This province contained the countries of the Cornavii, Silures, Demetae, and Ordovices, which are now Warwickshire, Worcestershire, Staffordshire, Shropshire, Cheshire, Herefordshire, Radnorshire, Brecknockshire, Monmouthshire, Glamorganshire, Caernarvonshire, Pembroke-shire, Cardiganshire, Montgomeryshire, Merionethshire, Caernarvonshire, Denbighshire, and Flintshire. For an account of the other two provinces, see Maxima Caesariensis and Valentia.

FLAVIANO, St. A town of Naples, in Abruzzo Ultra, near the Adriatic; 12 miles N. E. of Parmo.

FLAVIANUS, in Geography, patriarch of Antioch in the fourth century, is distinguished for his zeal in opposing Arius. Upon the death of Meletius, he was elected his successor, in the year 381, by the suffrages of the council of Constantinople, notwithstanding Paulinus, the colleague of Meletius, was still living, and that Flavianus himself had formerly sworn not to consent to the election of any successor to Meletius during the life of Paulinus. His election caused a considerable schism in the Christian world. The western bishops declared themselves on the side of Paulinus, and the greater part of the eastern bishops defended the rights of Flavianus. The death of Paulinus, and the prudent conduct of Flavianus, put the latter in quiet possession of his situation. After this he signalized himself in defence of orthodoxy, and in persecuting the heretics; he entitled himself to the gratitude of the citizens of Antioch by his successful interruption on their behalf at the court of Constantinople, when they had incurred the emperor’s displeasure, and dreaded his resentment. For during the course of a popular tumult, occasioned by the imposition of a new tax, various outrages had been committed, and the statues of the emperor Theodosius and his empress were overthrown. The most exemplary vengeance was threatened, but, by the eloquent intercessions of the patriarch, pardon was obtained for the offenders. The address which he delivered on this occasion was said to have been composed by St. Chrysostom, who thought very highly of Flavianus, as one of the greatest ornaments of the church. Flavianus died in the year 424. He published some epistles and some homilies. 

FLAVIANUS, patriarch of Constantinople in the fifth century, was elected to that dignity in the year 447. An unfortunate misunderstanding took place between Flavianus and Chrysippus, the first chamberlain and favourite of the emperor, which terminated in the ruin of the patriarch. He was deposed and banished; and, unable to sustain the severities inflicted on him, died in 450, at Hysoppa in Lydia, the place of his exile. Flavianus was the author of "Two Letters" to pope Leo, which are extant in the fourth volume of the "Collectio Conciliorum”; and also of "A Declaration of Faith delivered to the Emperor Theodosius," More.

FLAVIGNAC, in Geography, a town of France, in the department of the Upper Vienne; 12 miles S.W. of Limoges.

FLAVIGNY, Valerian de, in Biography, a French ecclesiastic, was born at Laon early in the seventeenth century. He was admitted to the degree of doctor of divinity by the faculty of the Sorbonne in the year 1628, and shortly was made canon of Rheims. In the year 1632 he was nominated professor of the Hebrew language in the college-royal of France, and discharged the duties of that office with high reputation. In 1656 he became dean of the college-royal, and died at Paris in 1674, at an advanced age. He was esteemed very learned in theology and the oriental languages, but was distinguished by much violence of temper and a very bitter spirit, which he displayed on many occasions. In 1663 he lodged a formal complaint before the faculty of the Sorbonne, against a thesis that had been maintained by the jefuits of the college of Clermont, the object of which was to prove, that, as the doctrine of Copernicus was contrary to scripture, condemned by the Vatican, and anathematized by the inquisition of Rome; it was decidedly inconfident with the faith of the church, and ought not to be defended in France. M. Flavigny, in answer to this, attempted to prove that the theses went to violate the rights of the king and kingdom, and to set at nought the authority of parliament. He engaged in many other disputes, but his controversies relative to the Polyglott published by M. le Jay, and the purity of the Hebrew text, is his most important work. It is known by the title "Epitole de leptaphis Panificibus." More.

FLAVIGNY, in Geography, a town of France, in the department of the Côte d'Or, and chief place of a canton, in the district of Semur, placed on the Ozerain; 27 miles W.N.W. of Dijon. The place contains 1523 and the canton 12,392 inhabitants, on a territory of 356 kilometres, in 23 communes.

FLAVIOBRIGA, in Ancient Geography, Verme or Bersaco, a town and colony of Spain, in the Tarraconensis, situated on the coast, at the bottom of a small gulf, in the country of the Autiones; called also, according to Pliny, Ammanum Portus.

FLAVIONA, or Flavium, a town of Spain, in the Tarraconensis, in the territory of the Picthus, according to Ptolomy; situated on the coast of the country of the Castiliri; supposed to be the modern Ayxent, a town and college of Thrace, which, according to Pliny, succeeded the name of Zela, and not far from Kairon. It derived its name from Vulcius and Tauris, who were of the Flavian family.—Atho, a town of Asia, in Bithynia; called also C. I. Cesneria, and Caesarea—Altus, a town of Asia, in Cilicia, situated at the foot of mount Taurus, and near the source of the Cilicys; probably the Flavia of the Itinerary of Antoninus, who marks it on the route from Casm to Cappadocia to Anazarbe.

FLAVIUS, in Geography, patriarch of Constantinople, the immediate successor of Acacius, was raised to that high dignity, from the situation of the see of the church of St. Theodosius. He soon took part in a stratagem, which the superstition of Zeno furnished him with an opportunity of practising;
practising. The prince, on the death of Aetius, deposited on the altar of the great church a blank letter, filled with his own seal, and accompanied with a writing, in which he and the whole church bound themselves to choose such a person whose name should be found written within the blank letter. The church was shut up, and all the avenues carefully guarded by night and by day. Forty days fasting was enjoined, during which prayers were offered up to the Almighty, that he would be pleased to direct an angel to inscribe in the letter the name of the person most adapted to the office. Flavitas bribed the soldiers or their commander, broke the seal, and inscribed his own name. Such, however, was his renown for piety, that no suspicion of fraud fell upon him, and when it was found that his name had been written by an heavenly hand, he was with loud acclamations proclaimed bishop of Constantinople. His hypocrisy was of little avail, though it cheated the foolish emperor and his superfluous court, for he had no arts to ward off the hand of death, to whose summons he yielded in a few weeks after his advancement. The fraud was now discovered; the estate of Flavitas was confiscated, and the perfom-participating in the villany was condemned to die. Morevi.

PLAUTINO, Ital. a small, or octave flute.
PLAUNTO, Ital. a flute.
PLAW, at Sec, signifies a sudden gale of wind, otherwise called squall.
PLAX, in Botany. See LINUM.
PLAX, Carolina. See POLYPRENUM.
PLAX, Purging. See LINUM Cathartica.
PLAX, Toad. See LINARIA and ANTIRRHINUM.
PLAX, Baby-dread. See THESIUM.
PLAX, in Agriculture, is the name of a plant cultivated equally for the bark, or covering of its stalk, and its seed; the former being used in making linen cloth, and the latter for oil which is drawn from it by pressure, and for the refuse or cake. The stem of the plant, which is round and hollow, grows to the height of about two feet, and then divides into several branches. The leaves are terminated by blue flowers, confiding of five petals, and are succeeded by capsules divided within, into two cells, in each of which is enclosed a bright, finely, elongated seed. The leaves are long, narrow, sharp-pointed, and placed alternately along the stem and branches of the plant.

Soil. The most proper sort of soil for flax is a deep, free loam, such as is not liable to become too much charged with moisture, or too dry; but which has been rendered fine by tilth, such as those situated in a valley bordering upon water, or as is thrown up by rivers. If there be water at a small depth below the surface of the ground, it is thought, by some still better, as is the case in Zealand, which is remarkable for the fineness of its flax; and where the soil is deep and rather dry, with water almost every where, at the depth of a foot and a half, or two feet, underneath it. It is said to be owing to the want of this advantage, that the other provinces of Holland do not succeed equally well in the culture of this useful plant; but that this flax is also raised on high lands, if they have been well tilled and nourished, provided the leas are not very dry and unfriendly to the growth in that way.

It has been remarked, in the papers of the Dublin Agricultural Society, that moist loam soils yield much greater quantities of flax, and for better feed, than can be obtained from light lands; and that the feed secured from the former may, with proper care, be rendered full as good as any that is imported from Riga or Zeeland. M. du Hamel, however, thinks that strong land can hardly yield such fine flax as that which grows on lighter grounds. With due pulverization and preparation, there can be no doubt but that flax lands will afford excellent crops of good flax. It is seldom that either light sandy or gravelly soils answer well for crops of this kind. Land for flax should neither be in too great a state of fertility, or be too much exhausted, as in the former case the flax is liable to become too luxuriant, and the produce in consequence of it, of a coarse quality; while under the latter circumstance the quantity of produce is very small.

It has been stated by Mr. Donaldson, that flax is sown after all sorts of crops, but is found to succeed best on lands lately broken up from grasses. And that in Scotland, the most skilful cultivators of flax generally prefer lands from which only one crop of grain has been taken, after having been several years in pasture. When such lands have been limed or marked, immediately before being laid down to grass, the crop of flax seldom or never misgives, unless the lenso prove remarkably adverse to it. It succeeds in general better after green crops, than those of the grain kind.

Preparation. The land, in order to render it fit for the growth of this sort of crop, requires to be rendered perfectly fine and mellow, by being repeatedly ploughed over, and broken down by severe harrowings. Where grass is land to be broken up for this crop, it should be done in the autumn, and left exposed to the influence of the atmosphere, until the early part of the following year, when it should be well pulverized and broken down by heavy harrowing, then in the course of a week or two ploughed again, in which flax it may remain till the period of putting in the seed, when another light harrowing should be given, and the ploughing performed afterwards by a very light furrow. But in cases where the crop is sown after grain, or other crops that have the property of keeping the land clean from weeds, the first ploughing need not be given till January, when it may remain in that situation until it becomes pretty dry in the early spring, being then well reduced by good harrowing and rolling; and after continuing in that state about a fortnight, the seed may either be immediately put in, or another light ploughing and harrowing be performed.

Sec.—With regard to the choice of seed, the same writer states that, that which is of a bright brownish colour, oily to the feel, and at the same time weighty, is considered the best. Linseed, imported from various countries, is employed. That brought from Holland is however in the highest estimation, as it not only ripens sooner than any other that is imported, but also produces greater crops, and flax of that quality which best suits the chief manufactures of this country. American feed produces in common fine flax; but neither the quantity of flax, nor of the pods, provincially the "boils," which contain the seeds, is so large as the produce from Dutch linseed. The Riga feed yields a very coarse sort of flax, but a greater quantity of seeds than any other. It is common in some parts of Scotland to low feeds sowed from the crop preceding year, especially when the crop was raised from feed imported from Holland. The success of this practice is found to depend greatly on changing the seed from one sort of soil to another of an opposite nature; but the varying is the expense of purchasing that low feed, in place of what is newly imported from Holland, is so inconsiderable, and the risk of the crop misgiving, so much greater in the one case than in the other, that it is supposed these only who are ignorant of the consequences, or who are compelled from necessity, are chargeable with this act of ill-judged privity in the business.
The cultivators of flax in Ireland prefer the American feed for the lighter and more elevated exposed lands; but the Baltic or Dutch for those which are of a heavier quality. The feed of home produce is often sown for white flax in Yorkshire; but the Baltic feed is most commonly preferred where the soil is of a better kind; for the ensuing year, and one or two afterwards, it is seen to enrich as well as whiten the soil. But it is highly probable that if the feed which has been collected from the perfectly ripened flax of our own growth be made artificial, it will be equally productive in both the flax-y flax fibre and the quantity of feed, and the former be equally valuable for all the purposes of the manufacturer.

Propriety of Seed. — In respect to the quantity of seed used, it varies in different places according to the circumstances of the soil, the methods of sowing, and the use to which the crop is to be applied; but from two bushels to two bushels and a half, the English statute acre, is the ordinary allowance. In determining the proper quantity necessary for the acre, it is requisite to pay great attention to the condition of the land. When the land is rich and fertile, and the season favourable that it can be got thoroughly pulverized, if too much feed is sown the crop is in great danger of lodging; and when that happens, particularly before the pods are formed the flax proves considerably in quantities, and very inferior in quality. When cultivated in the drill mode at narrow distances, a much less quantity will be sufficient than in other cases; and where the intervals are large, scarcely one half the quantity is required. When the crops are intended for feed, in whatever manner the sowing is performed, much less will be necessary, than where flax is the main object of the grower.

Time of Sowing. — It may be observed, that this must depend much upon the soil and situation, but that the ordinary season of sowing flax feed is from the middle of March to the middle or end of April; but the last week of March, and the first ten days of April, are esteemed the best times; and, accordingly within these periods the greatest quantity of flax feed is sown in this country. In the county of York, where this sort of crop is grown on land broken up from grass, the feed is commonly sown before the second week in April, where it can possibly be done; while on such lands as have been in a previous state of tillage, the sowing is frequently deferred a week or ten days longer. Wherever it can be safely practiced, early sowing has the advantage of getting the flax plants to cover the surface of the land well, before they can run much risk of injury from the rilling of weeds, or the parching effects of heat.

In some of the southern counties of England, however, the husbandmen who raise flax sow part of their feed in September and October; so that the plants which spring from these remain of course in the ground all the winter; and this may be a judicious practice in these places, because plants which have not covered the earth well before the summer heats come on, are apt to be parched by the heat and drought which usually prevail in that season. They sow indeed again also in the spring; but the latter does not yield so large a crop; the flax, however, which it produces is more esteemed, because it is finer than that sown in autumn. M. du Hamel seems indeed to think, that the autumnal sowing yields the best feed; but, however that may be, in places where the winter is apt to be severe, and where the flax, which is but a tender plant, would in course be in danger of being destroyed during that season, almost all the flax is sown about the end of March, or in the beginning of April, as already stated.

It may be laid down as a general rule, that the land which is intended for flax crops should be broken to an exceeding fine tilth, in the way directed above, before the feed is set in; and that it should be enriched by some sort of manure suited to the quality of the soil. Then, when pasture lands are broken up, in order to their being broken with flax they must be well worn by the plough several times before they will be fit for producing Such crops, in the manner just described. To delay the expense of this culture, some other crops may be got; if the land in the mean time, especially of such kinds as require very light, or, and particularly of those which are remarkably benefited by frequent flinging of the earth while they grow, such as beans, peas, turnips, &c.; because these repeated flirings render the mould fine and loose, and help to kill the weeds, which would otherwise do great damage to the flax. It is asserted that the Livonians, when they clear wood land, burn the wood upon them, then plough them, and in this state prefer them to any other kind of soil for flax crops. If the land which is intended for flax be fine, great care should be taken not to work it when it is wet, for fear of knetting it; but it is often an excellent plan to work it deeply before winter, when dry, laying it up in very high ridges, in order that the winter frosts may the more effectually moulder and loosen its parts. In the month of February, where the land is not too wet, some very rotten dung should be laid on, and immediately covered over with the mould. The feed should afterwards, at the proper season, be sown, and harrowed in with a light or bush-harrow, so as not to bury it too deep. As this, when young, is a very tender plant, and is more easily injured and checked in its progress by weeds than any other that is usually cultivated in the field, it is indispensably necessary that the danger of injury in this way should be well guarded against, in order to save future trouble and expense.

Methods of Sowing. — Where the principal object of the grower is flax, the most general method of putting in the crops is that of sowing them broadcast over the surface of the land. In performing the operations, much care is necessary that the feed be distributed as evenly as possible over the ground, to prevent the plants rising in an unequal or tawdy manner. It should be afterwards covered in by regular harrowing, once or twice in the place, with a light common or bush-harrow, as just noticed, not covering it too deep.

But where the feed constitutes the chief intention of the cultivator, it is contended by some that the drill mode is preferable as requiring much less feed in sowing, and affording a much better and more abundant produce. Beaks, the irrigation, and weight of the feed render it extremely proper for being drilled, and the crops can be kept clean with greater facility.

In this method, the distances of the rows or drills should vary according to the circumstances of the soil, and the manner in which the crops are to be kept clean. Where the land is to be chiefly depended upon, narrow distances may be proper, as ten or twelve inches; but where the work is to be principally executed by the hand-beer or cultivator, larger intervals may be more desirable, as those of eighteen or twenty inches. Slight harrowing and rolling are sometimes afterwards necessary, especially the latter in dry seasons.

It has been observed that thick sown flax runs up in height, and produces fine leaf flax; but that when too thick this does not rise to such a height, but spreads out more, feeding off a greater number of side branches, which produce a great abundance of seed, which is much better filled, more
more plump and heavy than that which is produced from thick Iowa flax crops. Flax crops cultivated in this way are set too liable to be beaten down in bad weather, the flax being stronger and better fortified by the more free admixture of sun and air among them; and they are not so much exposed to danger in weeding or clearing the rows.

After-Culture of the Crop.—Where flax crops are grown in the broad-cultivated method, they are seldom much attended to afterwards: it is, however, highly useful and necessary that they should have one good hand-hoeing, or weeding, as soon as over the crop is sufficiently up; care being taken not to injure the plants by too much treading amongst them.

In the drill manner of fowing, the after-culture of the crops must be regulated by the distance of the rows; but they may in general be cleared from weeds, and kept in vigorous growth, by proper implements and horse labour.

The ground between the rows is mostly worked by a proper horse-hoe, cultivator, or small horse-hough, taking care that none of the mould is thrown against the rows; to prevent which, the intervals may be hoed with a triangular hand-hoe or proper number of rakes in it, and guided by two handles fixed behind. By these means the spaces are made to go deeper or shallower at pleasure; and if the intervals are cultivated with this instrument, beginning before the earth is become flaky, and while the weeds are small, the land may be kept very clean, and in fine tilth, at much less expense than by hand-hoeing: for one horse is sufficient for this work. A great deal may be done in a day; and by a frequent repetition of the hoeings, especially when the earth is dry, the weeds may be so effectually kept down, as never to rise to any height. But the rows must be weeded by hand.

Flax is sometimes damaged by insects, when it is about three or four inches high. There it is laid, may be destroyed by a flight of ground of foot, after which it is over the crop. At all events, this dressing will give vigour to the flax, though it may not kill the insects. If any weeds appear afterwards among the flax, as is almost always the case, they must be thoroughly rooted out; and that the flax may as little damaged as possible in the doing of this, the weeder should work as carefully as possible.

The finest flax is most liable to be laid, particularly in countries subject to flurries. To guard against this accident, some people run across their flax-fields flender poles fixed to flakes; but a better method is to run small ropes across the field, both lengthwise and breadthwise, where necessary, for these being fashened where they intersect one another, and supported by flakes at due distances, form a kind of net-work, which is proof against almost every accident that can happen from tempestuous weather. These practices are, however, both troublesome and expensive, and are seldom or ever necessary where the crops have not been grown too thick on the ground.

Pulling the Flax.—Opinions are divided in regard to the degree of ripeness at which it is best to pull flax crops. Some think it should be pulled whilst it is green, in order that its fibres may be the softer and finer. Others, with the same view, pull it up before its seeds are quite formed. And others, again, think that it should not be pulled till the capture which contain the seeds have begun to open; being of opinion that the fibres of green flax are too tender, and that they fall into tow. On the other hand, it is certain that the fibres of flax which has stood till it is very ripe are always firm and hard, that they are not easily separated from the seed, and that they do not bleach well. Here, therefore, as in most other cases, both extremes should be avoided; and it consequent seems most reasonable to think, that the proper period for pulling flax is when its flakes begin to turn from green to yellow, when its leaves begin to fall, and when its seeds begin to be of a brownish colour.

MR. DODDSON observes, that a crop of flax frequently grows fast, and runs out a great number of seede-bearing branches. When that is the case, the seeds, not the flax, ought to be the farmer's chief object; and the crop should be allowed to fall till the seeds are in a great measure perfect. But that when the crop thrives, and is likely to become more valuable for the flax than the seeds, it should be pulled from after the bloom drops off, and before the pods turn hard and sharp in the pits. Whenever the seed is the main object, the crop should be perfectly ripened, which is clearly shown by the points of the pods turning hard and sharp, and the capsules beginning to crack. It usually takes place towards the end of July, or beginning of the following month.

Where the object is the flax, the crop is pulled up by the roots, and placed in small parcels, usually termed 'beats,' upon the surface of the land, so as it may be as fully as possible exposed to the benefit of the sun. It is afterwards tied up, in order to be conveyed to the place where it is to undergo the process of watering.

In the work of pulling the flax, it is usual, when it is intended to save the seeds, to lay it in handfuls, partly across each other: the reason for which is, that the burrs of 'ripping' is thereby facilitated; as the ripplers, in place of having to separate each handful from the bundle, find it, by this simple precaution, already done to their hand.

It may be further observed, that although it is of much importance, yet it very seldom happens, that much attention is bestowed to separate the different sorts of flax from each other; in pulling the crops. It is perfectly ripened, which is clearly shown by the points of the pods turning hard and sharp, and the capsules beginning to crack. Therefore, when flax of various qualities is promiscuously mixed together in pulling, it is impossible to prevent some part of it from being lost in the after-management; a loss which might be avoided with a small share of attention, and some additional trouble when the crop is pulled. Those who rent flax-mills are often blamed for embroilment; but, there is reason to believe, very unjustly. Because the crop of a particular part of a field yields a such a quantity of flax from one mill, it does not follow that the manager of another mill should return an equal quantity from the same space, probably, of very inferior land. It is certain, in very many cases, that the attention of flax-farmers to the above very necessary precaution is the cause, why crops of flax often turn out of the little value, and is the principal reason why the proportion of tow or inferior flax so often exceeds, in ordinary seasons, that of superior quality; the millers and hecklers being obliged, in the course of their operations, owing to the mixed state in which they receive the crop from the growers.
FLAX.

grower, to reduce the quality of the whole to a lower standard than there would be any occasion for, were the different qualities sorted, and put into their hands in that state.

As the flax is pulled, when for feed, it is, as has been observed above, laid together by handfuls, with the feed ends turned to the fourth. These handfuls should neither be quite in a line with each other, nor directly across, but a little slanting upwards, so that the air may easily pass through them. Some, instead of this method, tie the handfuls of flax loosely at the top, then spread out their roots, and thus set several of them together upright upon their roots. In either of these ways the flax is generally left twelve or fourteen days in the field to dry it. This drying is certainly not necessary for the rippling, because the ripple will separate the capsules from the flax as effectually before it has been dried as it will afterwards; and if it be done with a view to ripen the feed, it should be considered, that the flax will be more hurt by the longer time of steeping, which will become necessary in consequence of this drying, than the feed can be benefited; because the more the substance or membrane which connects the fibres to the seed is dried, the greater must be the degree of putrefaction necessary to loosen and destroy the cohesion of this connecting medium or membrane; the finer parts of the flax itself must necessarily be destroyed by this degree of putrefaction; and if the putrefaction does not arise to such a degree as to destroy the cohesion of this substance or membrane, the fibres of the flax will adhere so strongly to the seed, that the force necessary in scattering will prove equally detrimental to the flax. The practice adopted in some parts of Brittany seems therefore much more rational, which is, to ripple the flax after it has lain in the air two or three days; but even one day will be sufficient if the weather is dry. In fact, it is the best method to do it as soon as possible after the flax has been pulled.

Rippling the Seed.—In order to ripple, or force off the feed-capsules of the flax, which is the next operation, a large cloth should be spread on a convenient spot of ground, with the ripple placed in the middle of it. This is a sort of comb, consisting of fix, eight, or ten long triangular teeth, let upon a base, having the angles approaching pretty near each other, by which the parts containing the feed are removed from the flax. In performing the bufincox, the pods containing the seeds are forced from the flax by means of this iron-comb, which is called a ripple, and which is firmly fixed on a beam of wood, on the ends of which two persons sit, who, by pulling the feed-ends of the flax repeatedly through between the teeth of this comb, execute the operation in a very complete manner, and with great dispatch.

After the flax has been rippled, the seeds and pods thereby obtained should be spread out thinly upon a cloth in the sun to dry and harden. Those seeds which separate from the pods of their own accord are the fullest and ripest, and should therefore be kept apart for fowling, in cafe the precaution of raking some flax purposely for feed has not been attended to. The pods or capsules are then broken open, either by lightly treading, or by thrashing, in order to get out the remaining feed, the whole of which, as well as the former, should be carefully sifted, winnowed, and cleaned from dirt and chaffy matter. When the feed is laid up, which should be immediately done, it must be frequently stirred and ventilated, to prevent its heating.

This second sort of feed affords a considerable profit by the oil which it yields, and also by being used when broken for fattening of cattle. The cakes of linseed, after the oil has been pressed out of them, are likewise found to be useful for this last purpose, though they are thought by some to render the fat of cattle yellow; for which reason it is advised not to give it them till within a few weeks before the b. alks are to be killed. They are likewise of great utility as a manure, but from the expense can seldom be employed in that way with advantage. See Oil-Cake.

It has been remarked by the author of the "Prefert State of Husbandry in Great Britain," that those who bestow most attention on the cultivation of flax in Scotland, generally ripple off the seed, even when there is no intention of faving it; as it is found, when flax is put into water without taking off the pods, the water soon becomes putrid, in consequence of which the flax is greatly injured. This imperfectly ripened seed is improper for being town, but may be expressed for the oil. But when it is proposed to fave the seeds of flax, the pods are carried home from the field as soon as they are separated from the flax; and either laid on cloths, and exposed to be dried by the influence of the sun; or they are spread on barn-floors and turned two or three times a day, till they are so dry that the seeds can be easily threshed out in the ordinary way. This is the method adopted in Scotland. But in Dorsetshire they allow the flax to be rippled and after it has been pulled, till the pods become so dry, that the seeds can be threshed out with a flack; which is done on a board, or log of wood, placed in the field for the purpose. It is likewise the practice with some expert flax growers, where the chief object is the feed, to set it up, after being tied up into sheaves, in the manner of corn, and, when thus rendered perfectly dry, to flack it until the spring following: in which time, by placing the tops of the sheaves so as to incline towards each other, and making use of a roller, the feed is readily forced out. It is supposed that in this mode more time is allowed in the after management of the produce.

It may be stated, that the quantity of feed produced on the statute acre is generally from six to eight, but sometimes as high as ten or twelve bushels; and that the price depends in a great measure on that of foreign feed imported; as, when sold to oil-makers, it is generally about one-half of that of Dutch feed, sold for the purpose of bowling. The price of home-cultivated linseed is considerably advanced of late in some of the southern and eastern counties of the kingdom, in proportion to what it is in those of the northern, owing to the circumstances of its being much used as food for fattening cattle. The average price of the linseed cultivated in the kingdom at large cannot, it is supposed, be rated higher than from three to four shillings the bushel. It has, however, lately been considerably higher.

Watering.—This is the next operation that becomes necessary with this sort of produce. The intention of this process, is that of inducing the separation of the flaky material, by exciting a flight degree of fermentation in the substance which attaches to it the smell of the plant. It is accomplished in two ways, namely, by steeping the flax in water; and exposing it to the action and influence of the atmosphere. The former is the most common and safest method; the latter being less certain and exact in producing the necessary changes. The first mode is termed water-setting, and the last air-setting.

In water-setting, when the flax has been cleared from the feed, it is loosely tied up into small bundles, and put into pools or ponds of soft stagnant water, where it is suffered to continue several days, according to the natural warmth of the water. As soft clear stagnant water has been...
FLAX.

been found by long experience to be superior for this purpose to any other, where that cannot be obtained without art, a pit or canal may be formed adjoining a river or stream, whence water can be readily brought. This pit or canal is filled with water for some time (a week or two) before it be prepared to pull the flax: by this means the water acquires a greater degree of warmth than river-water pozzolans, and which contributes greatly to facilitate the object. Farmers have in view in immersing green flax in water, namely, to make the hale or flaky fibrous part easily and completely from the boon or reed.

With respect to the period that flax ought to remain in the water, it depends on various circumstances; as the state of ripeness in which it was pulled, the quality and temperature of the water, &c. The most certain rule by which to judge when flax is sufficiently watered is, when the boon becomes brittle, and the hale separates easily from it. The method of depositing the flax in the water is in general that, after having it tied in small bundles, often at both ends, of placing it in a sort of square bed, the bundles being laid lengthways and crossways of each other, so as to bind firmly together, the whole is kept down by having a part of the bundles stuck in it. Some, however, instead of this mode, have the small bundles set in a erect position, the tops of every layer, except the lowest, being upwards; and in place of keeping them down by the application of heavy weights, the flood or earth, treading the whole down occasionally, once or twice at first in the course of the day, so as to keep the whole below the surface of the water, as, where the contrary happens, the flax is greatly injured by being rendered black. The first is, most probably, the best mode of management.

When the flax has remained the proper length of time in these pits, it is taken out by means of a tool called a drag, and deposited in a directed manner on the sides or banks of them, in order to its becoming in some measure dry, and in a state for being spread out on the grass.

With regard to dew-reeling, although it is in general the practice, where flax is cultivated in this country, to immerse it in water for some time after it is pulled, yet in Dorsetshire, and the neighbourhood, it is seldom done. There the flax is allowed to arrive at that state in which the hale parts separate most easily from the boon or reed. By a more gradual process, that of ripening or producing the necessary purification, by the action and influence of the dew, which is nothing more than exposing the flax to the influence of the weather, thinly spread out upon a grass field for a longer period than is necessary, when the operation of watering has been previously performed. When the flax has been so long exposed as to be judged sufficient for effecting the separation of the hale, nothing more is requisite than putting it up in parcels, or bundles, in order to its being broken and feathed.

Drying.—After reeling the flax, where the watering method is pursued, the only other operation which properly falls under the farmer's attention is drying it. For this purpose it is commonly spread very thin on the ground, and in regular rows; the one being made to over-lap the other a few inches, with a view of preventing, as much as possible, its being torn up and scattered by gales of wind. Old grass-ground, where the herbage does not grow to any great height, is the best for the purpose; as, when the grass or weeds spring up so as to cover the flax, it is frequently rotted, or at least greatly injured thereby.

Flax is allowed to remain on the ground, being occasionally turned, till, by repeated trials, it is found that the boon has become very brittle; so that on being broken, and rubbed between the hands, it easily and freely parts from the hale. It is then taken up, a dry day being chosen for the purpose; and, being bound in sheaves, is either sent directly to the mill, which is the usual practice in the northern districts, or broken and feathed, in the manner they do hemp, by a machine or tool contrived for that use.

But before these operations are capable of being performed, it is necessary that the flax should be exposed to the heat of the sun, by placing it against a wall or paling, in a sloping direction, or to the gentle heat of a fire, by putting it over hurdles, or by introducing it into an oven, heated by the refuse flax. The heat in any way should be very moderate, and regulated in an equal manner. And in either case the flax should only be suffered to remain just long enough to dispel any dampness that it may have acquired. The sun is, however, always to be preferred where it can be had.

With respect to the produce, there is scarcely any crop that is more variable than that of flax in the quantity and quality. From twenty to seventy stone of fourteen pounds each have been produced from an acre of land; but from forty to fifty stone may be considered a medium crop. The expense of the cultivation, and management of this crop afterwards, cannot be estimated on the average at less than from nine to twelve or fifteen pounds the acre, where flax is the object.

It has been calculated in these ways in a northern and southern district of the kingdom, before the late great advance in the price of labour.

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<tr>
<th>Expenses per Acre.</th>
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<td>Loading and watering, &amp;c.</td>
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<td>Dressing 50 stone of flax, at 1s. 6d. per stone</td>
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<td>Profit</td>
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| £ 20 10 0 |

50 stones of flax, at 8s. per stone — 20 10 0

The next profit stands higher in the following:

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<td>Rent, tythes, and taxes, &amp;c.</td>
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<th>Product.</th>
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<td>Forty stones of flax, at 9s. per stone</td>
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<td>Bounty, at 4d. per stone</td>
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Profits — 10 0 0

£ 1 a
FLAX.

In Scotland, where the flax is often held before it is pulled, the usual price was formerly from six to ten pounds the statute acre.

The produce and value of the seed has been shewn above.

It seems, on the whole, not improbable but that flax crops may be grown in many situations with advantage.

It is usual for farmers in different parts of Scotland, who rent lands in the vicinity of large towns or villages, to let fields to the inhabitants, for the purpose of raising flax; which is supplied by some the most advantageous mode of any that can be adopted in cultivating the crop. The rents in these cases are mostly fixed at from 3l. 10s. to 4l. the statute acre, according to the quality of the land, the farmer constantly undertaking to cultivate the land in a proper manner. The same practice, with a little variation, is also established in some parts of England; the farmer rents or lets the land to a person who is denominated a middle-man, or flax-jobber, and whose business it is to perform all the various operations after the feed is sown; which, as in the former case, is always furnished by the renter, the farmer having nothing more to do than to plough and harrow the ground.

When not grown upon newly broken upland, flax may succeed turnips and potatoes with great propriety. The seed is usually called "linseed," which see. See also OIL.

FLAX-DRESILING, denotes the various operations which are necessary for bringing flax into a state of preparation proper for being formed into cloth or other articles. These are very different, and require different sorts of implements and machinery, in order to their being properly performed. Flax, for the purpose of being formed into cambrie, fine lawn, thread, and lace, is drested in a rather different manner to that which is commonly employed. It is not fletched so thoroughly as common flax, which from the fechting proceeds to the heckle, and from that to the spinner: whereas this fine flax, after a rough-fechting, is scraped and cleaned with a blunt knife upon the workman's knee, covered with his leather apron; from the knife it proceeds to the spinner, who, with a brush made for the purpose, straightens and drests each parcel, just before he begins to spin it.

And in the Swedish Transactions for the year 1747, a method is given of preparing flax in such a manner, as to resemble cotton in whiteness and softness, as well as in coherence. For this purpose, a little sea-water is directed to be put into an iron pot, or an untinned copper kettle, and a mixture of equal parts of broth-ashes and quick-line stirred upon it; a small bundle of flax is to be then opened and spread upon the surface, and covered with more of the mixture, and the stratification continued till the vessel is sufficiently filled. The whole is then to be boiled with sea-water for ten hours, fresh quantities of water being occasionally supplied in proportion to the evaporation; that the flax matter may never become dry. The boiled flax is to be immediately washed in the sea, by a little at a time, in a basket, with a smooth stick at first, while hot; and, when grown cold enough to be borne by the hands, it must be well rubbed, washed with soap, laid to bleach, and turned and watered every day for some time. Repetitions of the washing with soap expedite the bleaching; after which the flax is to be beat, and again well washed; when dry, it is to be worked and carded in the same manner as common cotton, and pressed between two boards for forty-eight hours. It is now fully prepared and fit for use. It lores in this process nearly one-half its weight, which, however, is abundantly compensated by the improvement made in its quality, and its fitness for the finest purposes.

FLAX-BRACE, a hand-instrument, or machine, which was originally, and for many ages, chiefly employed in breaking and separating the boon or core from the flax, which is the cuticle or bark of the flax. In performing this business, the flax being held in the left hand, across the three under teeth, or swords of the brake, shown at A, Plate (Flax) Agriculture, fig. 1, and as, fig. 2: the upper teeth or swords B, fig. 1, and b, fig. 2, are then, with the right-hand, quickly and often forced down upon the flax, which is artfully shifted and turned with the left hand, in order that it may be fully and completely broken in its whole length.

FLAX FOOT-BRACE, an implement or machine of the brake kind, invented in Scotland, by which flax is broken and scutched with much greater expedition than by the hand-instrument just described; and in a more gentle and safe manner than by the flax-mill. By this contrivance, the boon or flax is well broken, and the flapping brake given as with the fechter, while the machine is moved by the foot. The treadle is of considerable length, on which account it is put in motion with great facility, and affixed in it by means of a fly. The flutchers are fixed upon the rim of a fly-wheel. But though these machines may be highly useful where mills turned by water cannot be established, they are probably much inferior in point of expedition, and the economy of labour. A brake of this kind is represented, in different views, at figs. 3 and 4, in which is shown, by A, the three under-brake teeth, or swords, seventeen inches long, three inches deep, one and a quarter inch thick at the back, and a quarter-of an inch at the fore-part or edge.

B, the edges, two and three quarters of an inch asunder at the end next the guide B, and two inches asunder at the other end.

C displays the two upper teeth, about an inch shorter than the under teeth; and

D represents the brake-mallet, about thirty-three pounds English weight.

E is a compound foot-treadle, which is eight feet four inches between the fulera F, raised at F eight inches above the ground, (or rather five inches higher than the flaxen of the workman); E is two feet four inches between the fulera G, and is raised at G eighteen inches above the ground; that is, fifteen inches higher than the flaxen of the workman.

H, the fword, or upright timber-rod, which turns the wheel by the treadle-crank.

I, the treadle-crank, of seven and a half inches radius.

K, the fly-wheel, four and a half feet diameter, above sixty pounds English weight. As here represented, it is beat on cast-iron, but it may also be made of timber.

L, braia cords orbufles.

m M, the lifting crank; M is fixed firm upon the axle of the fly, while the crank m about eight inches radius, plays freely round the axle. In position first, M begins to take round the crank (which by the lever K pulls up the mallet); when it comes to position second, the mallet is again at liberty, and by its weight pulls up the crank (smaller than the fixed pieces move) into position third.

It may be observed that the treadle-crank is advanced about one-eighth part of the circle before the lifting crank.

n, a small pulley which turns easily round on the end of the crank, and to which a rope is fixed.
The filamentous parts of different vegetables have been employed in different countries for the same mechanic uses as hemp and flax among us. Putrefaction, and in some degree alkaline luxiva, destroy the pulp or bulky matter, and leave the tough filaments entire. By curiously putrefying the leaf of a plant in water, we obtain the fine flexible fibres which constituted the basts of the ribs and minute veins, and which form, as it were, a skeleton of the leaf. In Madagascar different kinds of cloth are prepared from the filaments of the bark of certain trees belied in strong ley; and some of these cloths are very fine, and approach to the softness of silk, but in durability come short of cotton; others are coarser and stronger, and last three as long as cotton: and of these filaments they make sails and cordage to their vessels. The filaments of nettles are sometimes used for like purposes even in France; and for Hans Sloane relates, in one of his letters to Mr. Ray, that he has been informed by several, that muffin and calico, and most of the Indian cloths, are made of nettles.

A strong kind of cloth is said to be prepared in some of the provinces of Sweden of hop-flax; and in the Transactions of the Swedish Academy for 1750, we have an account of an experiment relating to this subject: a quantity of the flax was gathered in autumn, which was equal in bulk to a quantity of flax, sufficient to yield a pound after preparation. The flax was put into water, and kept covered with it during the winter. In March they were taken out, dried in a stove, and dressed as flax. The prepared filaments weighed nearly a pound, and proved fine, soft, and white: they were spun and woven into five cloths of fine strong cloth. Unlefs the flax are fully rotted, which will take much longer time than flax, the woody part will not separate, and the cloth will prove neither white nor fine. See Dr. Lewis's notes to Newmann's Chemistry, p. 428, 429.

FLAY-CRAKE, in Agriculture, a provincial term, which is frequently applied to the scare-crow employed to keep rooks from new-town lands.

FLAYL. See FLAIL.

FLEA, Pulex. in Natural History, a genus of the order of insects of the roundish compressed figure, with two eyes; six feet, formed for leaping, and filiform antennae; the mouth is bent downwards, and conceals a small sting or piercer. The generation of this familiar vermin affords something very curious, first discovered by Sig. Dacincto Cellone. See PULEX.

Fleas bring forth eggs, or nits, which they deposit on animals that afford them a proper food; these eggs being very round and smooth, ulteriorly slip straight down; unless detained by the piles, or other inequalities of the cloaths, hairs, &c.

Of these eggs are hatched white worms, of a shining pearl colour, which feed on the finely furthance of the cuticle, the downy matter gathered in the piles of cloaths, or other the like furthance.

In a fortnight they come to a tolerable size, and are very lively and active; and, if at any time disturbed, they suddenly roll themselves into a kind of ball. Soon after this, they come to creep, after the manner of fireworms, with a very swift motion. When arrived at their size, they hide themselves as possible, and spin a filken thread out of their mouth, wherewith they form themselves a small round bag, or cafe, white within as paper, but without always dirty, and fouled with dust. Here, after a fortnight's rest, the animalcule bursts out, transformed into a perfect flea; leaving its exuviae in the bag.

While it remains in the bag it is milk white, till the second day before its eruption; when it becomes coloured, grows hard, and gains strength; so that, upon its first delivery, it springs nimbly away. (Phil. Trans. N. 239.)

The flea, when examined by the microscope, affords a very pleasing object. It is covered all over with back, hard and shelly scales, or plates, which are curiously jointed, and folded one over another in such a manner, as to comply with all the nimble motions of the creature. These fleas are all curiously polished, and are built about the edges with short spikes in a very beautiful and regular order. Its neck is finely arched, and much resembles the tail of a lobster; the head also is very extraordinary; for from the front part of it there proceed the two fore-legs, and between these is placed the piercer or sucker, with which it penetrates the skin to get its food.

Its eyes are very large and beautiful, and it has two short horns or feelers. It has four other legs joined all at the breast. When it leaps, it twists short one within another, and then exerting their spring all at the same instant, they carry the creature to a surprising distance. The legs have several joints, and are very hairy, and terminate in two long and hooked sharp claws.

The piercer or sucker of the flea is lodged between its fore-legs, and includes a couple of darts or lancets, which, after the piercer has made an entrance, are thrust farther into the skin to make the blood flow from the adjacent parts, and occasion that red round spot, with a hole in the centre of it, vulgarly called a flea-bite.

This piercer, its sheath opening sideway, and the two lancets within it, are very difficult to be seen, unless the two fore-legs, between which they are hid, be cut off close to the head: for the flea rarely puts out its piercer, except at the time of feeding, but keeps it folded inwards; and the belt way of seeing it is by cutting off first the head, and then the fore-legs, and then it is usually seen thrust out in convulsions.

By keeping fleas in a glass tube corked up at both ends, but to as to admit fresh air, their several actions may be observed, and particularly their way of coupling, which is performed tail to tail; the female, which is much the larger, standing over the male; they may also be thus seen to lay their eggs, not all at once, but ten or twelve in a day for several days successively, which eggs will be afterwards found to hatch successively in the same order. The flea may easily be deflected in a drop of water, and by this means the stomach and bowels, with their peristaltic motion, may be observed very plainly, as also their teats and penis, with the veins and arteries, though minute beyond all conception. Mr. Leeuwinkloek affirms also, that he has seen innumerable animalcules, shaped like serpents, in the fermen mufculum of a flea. Baker's Micros. p. 191, and 194.

Flea is also an infect which often does great mischief to crops of the hop kind. See Hops.

Flea-bane, in Botany. See Conyza.

Flea-bane, the common name of a plant of the weed kind, which is perennial, and common in pasture lands. It has a round, bending, solid, heavy stem. The leaves are oblong, sharp-pointed, wrinkled, downy, and embrace the stalk, on which they grow very thickly, without any regularity. It has yellow flowers, radiated and inclinato in a flower-cup, composed of narrow scales like bristles. And it has sometimes the name of fleawort. See Tachonanthus. fleawort, Pityriam. See Plantago.
FLEA-wort. See Flea-hone.

FLEA-hone. colour of a horse: is white, spotted all over with dark reddish spots.

FLEA. A common name, sometimes applied to a wattle hurdle, or kind of gate, which by negligent farmers is occasionally set up in the gaps of their hedge-fences. See Hurdle.

FLEAM. A small instrument of pure steel, composed of two or three moveable lancets, for bleeding a horse, or the like.

A case of fleas, as it is called by farriers, comprehends six sorts of instruments: two hooked ones, called drawers, and used for cleaning wounds; a pinknife, a sharp pointed lancet for making incisions; and two fлеамs, one sharp, and the other broad pointed: these last are somewhat like the point of a lancet, fixed in a flat handle, only no longer than is just necessary to open the vein.

There are many surgeons in Germany who bleed, or perform the operation of phthisotomy with this instrument, which they use in this manner: they hold one finger upon the end of it, which serves as a handle, and applying the point to the vein they are to strike, strike upon the back over the point with one of the fingers of the other hand, opening the vein much as farriers bleed horses. Others use a spring fleam, something like a single point of the fearfully instrument used in cupping; and others employ a sort of instrument in form of a dart; but as the position and size of the veins is different, in different subjects, no instrument will ever be found so useful as the common lancet of a proper size.

FLECHA, Matthew, in Biography, a Spanish Carmelite Monk, born at Prades, a small town in Catalonia; he was Maestro di Cappella to the Emperor Charles V. Amongst many other works in Spanish and French, he published "Divinarianum complutuum Psalmon," "Sectionem Brevem," and a "Salve Regina," together with a book of Motets at Prague, 1581; and died in 1604. in the Benedictine's College at Salzona, a large town in the State of Catalonia.

FLECHA, La, in Geography, a town of France, and principal place of a district, in the department of the Sarthe, seated in a pleasant valley watered by the Loire; 21 miles S.S.W. of Le Mans. N. lat. 47° 42'. E. long. 0° 1'. The place contains 5,699, and the canton 15,453 inhabitants, on a territory of 255 kilometres in 22 communes. In 1603, a college of Jesuits was founded here, by Henry IV., for the descendants of nobility only: the centre is converted into a town-hall, and the wings have been rebuilt as a seminary for the education of youth.

FLECHE, the name of a small work used in Fortification, having two equal faces, generally standing at an angle of about 85° or 90°, perhaps rather more, and deriving its designation from the French word fleche, meaning an arrow, to the head of which it bears much resemblance. This work is generally constructed along the front of the glacis, before the re-entering and salient places of arms: it confines only of a parapet, forming a faibant angle. The length of the faces may be from 20 to 25 toises, and the height of the work may be 8 feet; communicating with the covert way by means of a cut through the body of the glacis in a direct line: so that, by means of traverses, the defenders may make one or more flanks, and prevent their assailants from making any lodgement within the fleche, or in any degree commanding the place of arms before which it may stand.

FLECHIER, Esprit, in Biography, a French prelate, was born at Pernes, in the county of Avignon, in the year 1632. Though his parents were but of low rank, they contrived to give him a good education; and he made a rapid progress in the different branches of literature. At an early age, he was appointed professor of rhetoric in the college belonging to his order at Narbonne. In this situation he was called on to deliver, before the fletes of Languedoc, a funeral oration for Claude de Retè, archbishop of Narbonne. His discourse was received with raptures; and the success of this first attempt at such composition indicated the road which would lead him to celebrity. Some circumstances arose which induced him to try his fortune at Paris, where he was defers of distinguishing himself as a poet; but he not only failed in his expectation of a patron, but was obliged to drudge in the most subordinate duties of education to obtain a scanty livelihood. He was afterwards appointed preceptor to the son of M. de Cramart, counsellor of State, and remained some time in that situation; but his natural talents, with so much success, that he ranks next to Boffet. Of Flechier's orations, that for the great Turenne is the most celebrated. In 1673, he was chosen one of the forty members of the French academy; and in 1679 he published his "History of the Emperor Theodosius the Great," which was drawn up for the instruction of the dauphin, as a model of a pious and Christian monarch. After this he published "The Life of Cardinal Ximenes," in which he seems to have forgotten the character of this man as an intriguing politician. In 1685, Flechier was nominated by Lewis XIV. to the bishopric of Lavaur, on which occasion the sovereign paid him the highest compliment: "I have," says he, "made you wait some time for a place which you have long desired, but I was unwilling sooner to deprive myself of the pleasure of hearing you." Two years afterwards he exchanged the see of Lavaur for that of Nîmes, but not without great reluctance; though in a pecuniary point of view he was much benefited by the translation. Nîmes abounded with protestants, and the edict of Nantes had been just revoked. The persecutions which had followed that revocation had produced a crowd of martyrs, though it had added very few, if any, real converts to the catholic religion. In these circumstances, Flechier was considered as peculiarly qualified by his learning, eloquence, and zeal, to preside over that see. His moderation gained him the esteem of the protestants, who, in their retaliations on cruel persecutors, always held his dwelling in reverence. He was eminent for benevolence; and, during the scarcity in 1709, his charities were very great, and equally divided between the protestants and papists. He was free from pride, but never at a loss to chastise those who were ready to lock down upon him on account of his low origin. Some time before his death he had a dream, which he regarded as a preface of his approaching dissolution. He accordingly ordered a sculptor to attend with some designs for his tomb: he selected the most simple, being anxious that after his death there should be nothing ostentatious erected to his memory. When he bad made his choice, he said to the artist, "Begin your work without delay, for there is no time to lose." He died shortly afterwards, in the year 1710, lamented, says d'Alembert, by the catholiques, and deeply regretted by the protestants; and leaving to his brethren a worthy model of zeal and charity, simplicity and eloquence.
of any works, which, in the year 1782, were collected and published at Nîmes, in ten volumes octavo. Of his funeral orations, d’Alembert says, “their style is not only pure and correct, but full of sweetness and eloquence. They were truly pathetic; but this property became still more sensible, when the orations were pronounced by the author. His fiery action, and his flow and somewhat feeble voice, brought the hearers into a disposition of symptomatic sorrow: the soul felt itself gradually penetrated by the simple expressions of the sentiment, and the ear by the soft cadence of the periods. Hence he was sometimes obliged to make a pause in the pulpit, that he might leave a free course to plaudits, not of the tumultuous kind which refound at our profane spectacles, but expressed by that general and modest murmuring which eloquence, even in our temples, from an audience deeply moved; a kind of involuntary enthusiasm, which not even the futility of the places can repress.” Morell. Gen. Biog.

FLECKED, in Rural Economy, a term signifying pied, or streaked with different colours, as is often the case with cattle.

FLECKERAC, or FLECKERAN, in Geography, an island near the coast of Norway, in the North sea. Between the island and the continent is a famous harbour, which may be entered or quitted by the same wind. In the 17th century a fortress was built for its defence, so that the largest fleet may lie in it secure from storms or enemies. N. lat. 58° 1'. E. long. 59° 18'.

FLEDWITE, or FLIGHT-WHITE, in our Ancient Laws, a discharge, or freedom, from amercements: when one, having been an outlawed fugitive, comes to the peace of our lord and king, on his own accord, or with licence. Rathal.

Others rather take it to denote a muf't or fine, set upon a fugitive to be restored to the king's peace.

FLEECE, the name of the woolly covering thorn from off the body of the sheep, and rolled up in a long round form. Fleeces are of different weights and sizes, according to the breed of sheep. See Wool, and Sheep.

Fleece, the Golden, is famous among the ancient writers. It was this that the Argonauts, under the command of Jason, went in pursuit of to Colchis, a province of Asia, now called Mingrelia.

The mystery of the golden fleece is variously explained; either of the profit of the wool-trade to Colchis; or of the gold that they commonly gather there, with fleeces, in the rivers. Arthub. Diff. p. 223. See Argonauts.

Fleece, Order of the Golden. See Golden Fleece.

FLEECY HOSIERY, a kind of manufacture of modern invention and use, consisting of fine fleeces of wool interwoven into cotton pieces of the common flocking texture. The process of this manufacture may be thus described. Having twisted silk, cotton, yarn, &c. in the common flocking-frame, let the work be begun as in the common hophobia; and when a few courses are wrought in the usual method, in order to add a coating, draw the frame over the arch, and then hang wool or jersey, raw or spun, upon the beards of the needles, and slide the frame off their beards upon their frames, till it comes exactly under the ribs of the fawkens; then link the jacks and fawkens, and bring forward the frame, till the wool or jersey is drawn under the beards of the needles; and having done this, draw the frame over the arch, and place a thread of spun materials upon the needle, and proceed in finishing the course in the usual way of manufacturing hophobia with spun materials. The article thus manufactured has, on the one side, the appearance of common hophobia, and on the other side the appearance of raw wool.

FLEET, a number of vessels, going in company, whether on a design of war, or commerce.

In times of peace merchants ships go in fleets, for their mutual aid and assistance: in times of war, besides this security, they likewise procure convos of men of war; either to escort them to the places whither they are bound, or only a part of the way, to a certain point or latitude, beyond which they are judged out of danger of privates, &c.

The admirals of his majesty's fleet are classed into three squadrons, viz. the red, white, and blue. When any of these officers are invested with the command of a squadron, or detachment of men of war, the particular ships are distinguished by the colours of their respective squadron; the union is common to them all, and in those of the red squadron it is displayed on a red field; on a white for those of the white squadron, and on a blue field for the blue squadron.

A fleet, whatsoever be the number of ships of which it consists, is usually divided into three squadrons; and these again, when the ships are numerous, into three divisions, distinguished by a particular flag or pendant, and usually commanded by a general officer. The admiral, or principal officer, commands the centre; the vice-admiral, or second in command, superintends the van-guard; and the operations in the rear are directed by the rear-admiral, or officer next in rank. The most convenient order of a fleet, proceeding on a voyage, is that in which it is ranged into three lines or columns, each of which is parallel to a line close-hauled, according to the tack on which the line of battle is designed to be formed. The fleet being thus more inclosed, will more readily observe the signals, and with greater ease form itself into the line of battle, which see. See also Engagement.

The Spanish fleet went against England by Philip II., consists of a thousand vessels. In the East there have been fleets seen of three thousand vessels.

Merchant fleets generally take their denomination from the place to which they are bound; as the Turkey fleet, East India fleet, &c.

The Spanish call simply the fleet or flota, a certain number of vessels, belonging partly to the king, and partly to merchants, sent every year to Vera Cruz, a port of New Spain.

The flota consists of the captain, admiral, and patach or pinnace, which go on the king's account; and about sixteen ships, from four hundred to a thousand tons, belonging to particular persons. They are all so heavy laden, both going and coming, that they have much ado to defend themselves when attacked. The fleet puts out from Cadiz about the month of August, and makes it eighteen or twenty months before its return.

The fleet sent annually from the same port to Peru, they call the galloons.

When the two fleets put out together, they go in company as far as the Antilles, where they separate; the galloons for Carthagena and Porto Bello; and the flota for Vera Cruz; at their return they join at the Havana.

Of the two fleets the galloons are the most richly laden; not but the cargo of the flota is also very considerable.

Fleet, is also a famous prison in London, thus called from the river Fleet, on the border whereof it once stood.

To this prison persons are usually committed for contempt of the king and his laws; or upon absolute command of the king, or some of his courts, particularly that of chancery; and lastly, for debt.
FLEET, in Geography, a river in Kirkcudbright-shire, in Scotland, is navigable from Murray's falls in Wigtown bay, into which it enters by a wide mouth, called 'Fleet bay'; up to Gatehouse bridge, N. lat. 56° 35', W. long. 1° 47'.

Also, a river of England, in Darlington, navigable for barges from Portland Road at Pallante-House near Abbotthorpe, at the head of that remarkable ridge of pebbles and sand called Caulc bank. Also, a river of Nottinghamshire, which runs into the Trent. 8 miles S. of Newark.

FLEETING, in Sea Language, is the act of changing the situation of a tackle, when the blocks are drawn together; or what is called block and block by fairs. The use of fleeting is to replace the mechanical powers into a state of action, and the operation is nearly similar to that of winding up a clock of watch.

FLEETWOOD, William, in Biography, a learned English prelate, was born in the Tower of London, in the year 1596. He was initiated in clerical learning at Eton, from whence he was elected to King's college in the university of Cambridge. He took orders about the time of the Revolution, and became distinguished for the excellence of his pulpit talents. He soon obtained the honour of being chaplain to the king, and some other valuable preferment. He was appointed rector of St. Austin, and immediately, lecturer at St. Dunstan's, Fleet-street, where his sermons attracted great crowds of hearers. In the year 1651, he published an useful introduction to the knowledge of antiquities, entitled "Inscriptionum Antiquarum Sylloge, in duas Partes distributa," &c. octavo. The first part containing remarkable pagan inscriptions, collected from Gruter, Reinisch, and other writers; and the second containing of ancient Christian monuments; the whole illustrated with short notes, which were partly original, and partly selected from other writers. This work was well received, and contributed not a little to maintain the high reputation which the author had already acquired during his residence at the university. Mr. Fleetwood was next known as a theological writer. Of his works under this character, the principal was published in 1701, under the title of "An Essay on Miracles," which is reckoned a very ingenious performance, and was pronounced, by Mr. Farmer, as abounding in excellent reflections. A short time before, king William's decease, Mr. Fleetwood was nominated by his majesty to a canonry of Windsor; but, as the grant had not passed the great seal before the king's demise, the house of commons addressed queen Anne to allow that dignity upon their chaplain. She, however, attentive to the late king's wish, confirmed the grant in favour of Mr. Fleetwood, and also appointed him her own chaplain. About the year 1705, he resigned his rectory and lecturership, and retired to a small living which he had in the neighbourhood of Eton. He indulged his inclination for privacy, and applied much of his time to the study of church history and antiquities. In 1707 he published a work, entitled "Chronicon Precliormii," or "An Account of English Gold and Silver Money, the Price of Corn, and other Commodities, and of Stipends, Salaries, Wages, &c. in England, for six hundred Years last past." In the following year he was appointed, without his request, and even without his knowledge, to succeed bishop Beveridge in the see of St. Asaph. At this period, party rage and animosities ran very high, and no where more so than in the diocese of St. Asaph; but so high was the reputation of the new prelate, so great his prudence and address, so amiable and conciliating his manners, and so unbiased and exemplary his life and conduct, that he not only cleared all indecent and disreputable treatment, but secured the reverence and affection of his clergy, who almost all diffused from him in principle. The queen now frequently attended the sermons of her bishop, many of which were made public at his desire. He likewise constantly attended his place in the house of lords, where he conducted himself with dignity and spirit, maintaining his independence; and he was invariably governed in his votes by a regard to what he considered to be the true interests of his country. In his first episcopal visitation, he delivered and published a charge, which has been generally regarded as one of the most perfect performances of that kind. This was early in 1710; and towards the close of that year a change in the ministry took place, and new principles became triumphant at court. From these the bishop was very averse, and nothing could induce him to give his support to the measures of the new ministry, which he conceived to be equally prejudicial to the glory of the queen and the true interest of the nation. In the year 1711-12, he was appointed to preach before the house of Lords; but by some means it was known that the discourse which he had prepared was very hostile to the sentiments of ministers, and they accordingly adjourned the house beyond the day on which it was to have been delivered. The bishop determined to print what he was prevented from preaching, and published it under the title of "A Sermon preached on Fast-day, Jan. 16, 1711-12, against such as delight in War, by a Divine of the Church of England." In the political part of this discourse, the bishop spake his mind with the utmost freedom, relative to what he judged to be the disgraceful and ruinous measures of administration; which so exasperated them that they resolved to lose no opportunity of repenting the infilt, as they deemed it. He next engaged in the controversy respecting lay-baptism, excited by Mr. Dodwell and others. In 1712, the bishop published four sermons, which he had formerly preached with great applause on the deaths of queen Mary, the Duke of Gloucester, and king William, and on the accession of queen Anne. In his preface he assigned the reasons for their publication at this particular period, and made some severe animadversions on the fashionable politics of the day. It was now determined to crush the bishop. With this view, ministers carried in the house of commons a motion that the objonuable work should be burned by the hands of the common hangman: to which it was replied, "the fire is certainly a conclusive, but not a convincing argument; it will destroy any book, but it refutes none." In 1713, bishop Fleetwood published, without his name, "The Life and Miracles of St. Wenefred, with her Litanies, and some Historical Observations made thereon." He undertook this work to counteract the attempts of papist emulators, who made use of it to induce to their faith the weak and silly among the crowds who repaired for the benefit of the waters to the well of Holywell, which was in his diocese. On the accession of the house of Hanover, Dr. Fleetwood was translated to the see of Ely; which new and unexpected dignity he received only to spur him on to be more diligent in the discharge of those duties which belonged to the episcopal office. His indefatigable labours are said to have worn him immunities, which produced a gradual decay, under which he sunk at Tottenhall, in Middlesex, whether he had removed for the benefit of the air. This happened in 1723, when the worthy bishop had attained his sixty seventh year. He had ever maintained an excellent character, and was a bright pattern of innocence of life, integrity of heart, and sanctity of manners. Beng. Brit.

FLEGIS, in Geography, a small island in the gulf of Engla; 8 miles E. of England.

FLEICHER, John Christopher, in Biography, a
very celebrated instrument-maker of Hamburg, at the beginning of the last century. He had harpsichords from 60, 70, and 100, to 1000 dollars each. His theorbo and other lutes were in the greatest request; and in all his instruments the imitative stops were ingenious, and the mechanism excellent.

FLEISCHER, M., a Brunswick composer of great merit, in 1723, whose church music, comic operas, and harpsichord pieces, are all written in an elegant and pleasing style.

FLEMEN, a term in Surgery, having two different significations, viz. a tumour near the ankles, and the hardened surfaces which occur on the hands and feet. Flemen (quinque flagmen) is said to be derived from fleas, to incline downwards.

FLEMENFRIT, Flemenfrith, or Flemishfrith, in our Old Writers, signifies the receiving or relieving of a fugitive or outlaw.

FLEESWITE. FLEISCHER, received in settlement of his haberd in the church of Leyden, and His haberd in the church of Amsterdam. In the course of a few years, he accepted of an invitation as pastor of a Scotch church in Lothbury, London. Here he expected to become more extensively useful as a minister of the gospel; he was moreover urged to make the exchange by King William, who often advised with him on the concerns of his own country. So great was his modesty, that he requested he might at all times be called to court with the utmost privacy. His great learning and talents procured him much respect abroad, and also in this country, where he was greatly esteemed by churchmen and dissenters, as well as by those belonging to the Scotch presbyterian ministry. He was on terms of friendship with the archbishop of Canterbury; and was chosen one of the preachers of the lecture, instituted by the merchants of London, at Sotterly-hall, every Tuesday. From his early years he was eminently devout; and he was firmly attached to the British monarchy and constitution. He died in 1716. He published several works; but that by which he was chiefly known is entitled "Chirnology, a Discourse concerning Christ." This excited much attention in the early part of the French revolution, on account of the striking coincidence between the author's interpretation of the fourth vial in the book of Revelation, and the events which were taking place at that period. Gen. Biog.

FLEEMING, Caleb, was born at Nottingham in the year 1698, and, while very young, he discovered an uncommon taste for literature, and employed every leisure moment in improving his mind, in which he had the assistance of a learned and liberal divine of his native town, who took the care of a small number of pupils. He continued at Nottingham some years, engaged in a mercantile employment, and then removed to London. He became intimate with Mr. Holt, afterwards one of the tutors at Warrington, who assisted and encouraged him in those studies which enabled him afterwards to embark in the work of the Christian ministry. His abilities and acquisitions had attracted the notice of Dr. Thomas, bishop of Winchester, who was desirous of making provision for him in the established church. A living was offered him in Cumberland, and Dr. Thomas benevolently proposed advancing a sufficient sum of money to defray the expenses of his journey and removal to so great a distance. His scruples upon the subject of conformity prevented him from accepting this liberal and very handsome offer; but he never ceased to acknowledge with sentiments of unfeigned gratitude the kindness of the worthy prelate. Nothing but a sense of right, and an ardent love of the truth, could have led him to decline the offered introduction to the national church; for he, at that time, had a wife and several children, and was almost destitute of every resource to provide for their wants. In forming his determination, he was encouraged by the magnanimity of his wife, who assisted him. He was ready to undergo any privations, and suffer any hardships, rather than accept of influence at the expense of his integrity and peace. From this moment he resolved to engage in the work of the ministry among the protestant dissenters, and was, after an interval of some years, chosen pastor of a congregation in Barb and exemplify, London. Here he continued in office till the year 1752, in which he was chosen assistant to the celebrated Dr. Potter at Pinner-hall, whom in a short time he succeeded in the pastoral office. The duties of which he discharged with exemplary diligence, until he became incapacitated for public service by the infirmities of age. He died in the year 1759, in the eighty-first year of his age. He was the author of numerous publications on important and interesting topics, relating to morals, the cause of Christianity, and of civil and religious liberty. The titles of many of these are given in the General Biography. He was an able and judicious defender of the truth of divine revelation, and a close and diligent inquirer into its doctrines. He was led to renounce what are called the orthodox tenets of established systems, and to embrace the simple unitarian creed. He was a steady and resolute upholder of the rights of conscience, and of private judgment; and considered the interposition of human power in matters of religion as the principal source of the corruptions of Christianity. His piety was cheerful and rational; his character and manners upright and exemplary; and his private and public virtues such as rendered him the object of warm esteem among those who enjoyed his acquaintance.

FLEMING, in Geography, a county of Kentucky in America, bounded N. by Mafon, S.E. by Virginia, S.W. and W. by Montgomery: it is mountainous, and watered by several streams which fall into Sandy and Licking rivers; it contains 4,903 inhabitants, of whom 240 are slaves. The chief town of this county is Flemingsburgh, containing 123 people, and a post-office.

FLEMINGIANS, or FLANDRIANS, in Ecclesiastical History, a sect of rigid Anabaptists, who acquired this name in the sixteenth century, because most of them were natives of Flanders, by way of distinction from the Waterlanders. In consequence of some dissensions among the Flemings, relating to the treatment of excommunicated persons, they were divided into two sects, distinguished by the appellations of Flandrians and Frierders, who differed from each other in their manners and discipline. Many of these in process of time came over to the moderate community of the Waterlanders; but those who remained separate are still known by the name of the old Flemings, or Flandrians, but they are comparatively few in number. These maintain the opinion of Manno, with respect to the incarnation of Christ, alleging, that his body was produced by the creating power of the Holy Ghost, and not derived from his mother Mary.

FLEMING, natives of Flanders, a colony of whom were established in South Wales by Henry 1, in order to strengthen
Agriculture, and they and receive their patronage of them, but from true notions of policy; with a view of increasing, by such an accession of useful inhabitants, the wealth and strength of his kingdom. Many of them were planted by William Rufus in the waste lands of Northumberland, and about Carlisle; and others were dispersed all over England, and began by their multitude to give some uneasiness, which Henry removed, and availing himself of them to still greater advantage, he sent them all to settle in South Wales; where he gave them the district about Tenby and Haverfordwell, in which their polity remain to this day. They were very industrious, and, at the same time, very valiant; skillful in husbandry, manufactures, and commerce, and equally expert in the use of arms: so that they answered all ends which can be proposed in planting a colony, cultivation of lands, improvement of trade, and defence of the country. William of Malmesbury speaks of them as a strong barrier, which restrained the Welsh in those regions from inflicting the English territories: and certainly such a plantation was a more effectual security than any fortress or bulwark. This colony was further strengthened by Henry II., who allowed some of the Flemish mercenaries, whom, in the first year of his reign, he banished out of England, to go to their countrymen established in Pembroke, and settle among them. This proved in the event a very politic measure; for this reinforcement of brave and veteran soldiers was sufficient to defend the Flemish colony, and a cessation of hostilities on the part of the Welsh soon followed that event. This colony was attacked in the year 1164, and their country ravaged by Rhus ap Gryffyth of Dynevor.

Flemings. If the Natives of Flanders and the Netherlands were not the inventors of counterpoint, many proofs are extant of their having successfully cultivated it at a very early period. Almost all the elder great contrapuntists, of whose works there are many remains, such as Ockeghem, Jucquin du Pres, Adrian Willaert, &c. were Flemings; as the most curious specimens of early counterpoint, among the printed music in the Museums, there is a collection of masses in four parts, the first that issued from the press after the invention of printing. They consist of the first and third part of the masses which Jucquin composed for the pope's chapel, during the pontificate of Sextus the Fourth, who reigned from 1471 to 1514; the masses of Pierre de la Rue, sometimes called Petrus Platensis, a set of masses by Anthony de Foven or Feun, Robert de Foven, and Pierzon. The masses of John Mouton; ditto of different composers, ("Miffie diversorum Autorum," &c.) Obrecht, Phil. Baffron, Brunel, Gafpar, and de la Rue.

All these were printed by Ottavius Petruccio da Fossembronc. He first published the masses de la Rue at Venice, 1503, and in 1508 those by different authors. In 1513, removing to Fossembronc, in the Ecclesiastical State, he obtained a patent from Leo the Tenth in behalf of his invention of types, for the sole printing of figurative song, ("Cantus Figurarum,"") and pieces for the organ, ("Or ganorum Intabolaturarum,"') during the term of twenty years. This patent is signed by the learned cardinal Llemback, Leo's secretary.

The masses are followed in this collection by the second, third, and fourth sets of Latin motets, in four or five parts, called "Motetti della Corona," from the figure of a crown stamped on the title page. The words of these excellent compositions consist of short portions of Scripture, and hymns of the Roman church, set by Jucquin, Carpentras, Mouton, Adrian Willaert, Contantius Festa, and other great masters of the same period: they were all printed at Fossembronc, in 1519 by Petruccio, and published with the same patent as the masses.

The only Italian composer amongst these is Contantius Festa, but there is so much of that grace in his melody, clearness and facility in his harmony, as have always been the distinctive characteristics of masters of the highest class in his country, that we can hardly think a genius so highly polished flood alone among such a number of foreigners at this early period; or that such regular compositions, and learned and ingenious contrivances, could be attained by the gigantic stride of any one musician, however superior his genius may have been to that of his predecessors.

FLEMMINGTON, in Geography, a small post-town of New Jersey, in Hunterdon county, about 6 miles N.E. of Amwell or Delaware river; 53 miles N.E. by N. from Philadelphia. It has a post-office and about 12 compact houses.

FLEMISH, or the FLEMISH TONGUE, is that which we otherwise called Low Dutch, to distinguish it from the German, whereas it is a corruption, and a kind of dialect. See Flemish Bibles.

The Flemish is the language used throughout the provinces of the Netherlands. It differs considerably from the Walloon, which is a corrupt French.

Flemish Brick. See Bricks.

FLEMISH Husbandry, in Agriculture, a name sometimes applied to that sort which was introduced from the Low Countries, and which consisted in the combining of the green crop system, with that of corn. It is supposed to have been practised there at an early period. See Husbandry.

Flemish School of Engravers. See Netherlands.

FLEMMING, Richard, in Biography, an English prelate, who flourished in the fifteenth century, and who was founder of Lincoln college, Oxford. He was born at Crofton, in the county of Lincoln. He finished his studies at the University college, Oxford; and was, in 1420, collated to a prebend in the cathedral church of York; and in the next year, he had the honour of being one of the proctors of the university. He now espoused warmly the cause of Wickliff, and, by his zeal, induced others to join in the same business. Some preference in the existing church induced him to change sides; and he became more violent in defence of what he had been in the habit of holding to contempt as gross corruptions, than he had been in the cause of reform. He obtained the friendship of Henry V., and was promoted, in 1420, to the bishopric of Lincoln. After this he was sent deputy to the council of Constance, where he obtained great applause by an eloquent speech delivered in the presence of pope Martin V., in vindication of his country against the calumnies and aspersions of the French, Spanish, and Scottish prelates. He was now probably appointed chamberlain to the pope; and, on his return, to exhibit his zeal, in subterranean to the decree of the crusade of Constance, he caused Wickliff's bones to be dug up and burnt. The see of York being vacant, the pope, by his own authority, translated Dr. Flemming from Lincoln to that archbishops; but the king put in his veto, and the disappointed prelate was obliged to be contented with Lincoln. After this he formed the design of founding a college, accordingly as a seminary for divines to write, preach, and dispute.
against Wickliff. Before he had made much progress in the building, he died at Sleaford, in 1430-31; leaving, however, sufficient money and effects in the hands of trustees to complete the undertaking. Biog. Brit.

FLEN, in Geography, a town of Sweden, in Sodermanland; 22 miles N.W. of Nykoping.

FLENSBO, a sea-port town of Denmark, situated on the eastern coast of the duchy of Slesvig, in a gulf of the Baltic, called “Fleensborgvick,” which extends about 18 miles inland, and forms a good harbour, so that the large vessels are unloaded at the quay, and secured from all winds by surrounding hills. It is the capital of a district, and one of the handomest and most commercial towns in the duchy; 22 miles N. of Slesvig. N. lat. 54° 47'. E. long. 9° 27'.

FLE'RON, a town of France, in the department of the Oise, and chief place of a canton in the district of Lesd. The place contains 950, and the canton 15,412 inhabitants, on a territory of 130 kilometres in 23 communes.

FLEsberg, a town of Norway, in the province of Agderhus; 36 miles W. of Christiania.

FLESH, in Anatomy, is understood to denote only the muscular substance of an animal body, although in common language it forms to include all the soft parts of the frame, except the skin. Yet it is used sometimes more loosely by the old anatomists, who speak of muscular flesh, glandular flesh, &c.

FLESH, in Rural Economy, the fine healthy fibrous matter that constitutes the principal value of domestic animals. The nature and properties of flesh are of great importance to the breeding and grazing farmers, in respect to the feeding and fattening of their animals. Such breeds as do not possessed perfectly good flesh should not be encouraged either in sheep flock or in cattle.

FleSs, also used in Theology, in speaking of the mysteries of the incarnation and eucharist.

The word was made flesh, Verbum caro factum est. The Romanists hold, that the bread in the sacrament of the supper is turned into the real flesh of Jesus Christ. See Transubstantiation.

FLESH, Fungous. See Fungus.

Flesh is sometimes also used for botanists for the soft pulpy substance of any fruit, included between the outer rind or skin, and the seeds, or done; or for that part of a root, fruit, &c. fit to be eaten.

Flesh-eater. See Carnation.

FEsh bay, in Geography, a bay of the Indian seas, on the coast of Africa. N. lat. 34° 35'. W. long. 22° 20'.

FLESHY, Carnosis, in Botanical Phytology, is used to express any more than ordinary degree of thickened or juicy skins in such parts as are naturally in some degree pulpy, as leaves. Witness the whole tribe of succulent plants, comprehending the genera of Aloe, Grifolia, Mammillaria, Sedum, &c. all which have folia carnosia, flabby, or very pulpy, leaves. It is also applied to fruits usually dry or juicy, when they happen, contrary to their general nature, to be pulpy, as the cape in Cerbera apoidea, and the receptacle of the seeds in the Strawberry; but in these last instances the word fructus, expressing a fruit allaining the nature of a berry, is more proper. Several species of Euphorbia, Peganomum, &c. have flabby items; and a great number of perennial plants, few annual ones, have flabby roots. In all such cases, the part is more durable, more tenacious of life, and less dependent on contingencies than it might otherwise be. The roots of some grasses, as Pileum pratense, though naturally flabby, become flabby, when they are exposed to occasional privations of food or moisture, by which they become more independent of such accidents in future.

Fleshy Roots, in Gardening, are all such as are constituted of a large mass of pulpy matter, whether in a laminated form, or the contrary. See Root.

FLESK, in Geography, a river of Ireland, in the county of Kerry, which flows into Lough Leane, better known as the lake of Killarney.

FLETEUS, in Ichthyology, a name used by some authors for the common flounder; the polar flounders of most writers. See Plenerpeye Ploca.

FLLET-Milk, in Rural Economy, such milk as has been skimmed, or had the cream taken off from it. This sort of milk is sometimes employed in forming a poor kind of cheese, termed skim-milk-cheese.

Fleta, in Biography. It is not a little singular that this, which is the title to one of our early law-books, should almost uniformly have been noticed as the name of a writer on law, and that by him cited in the title. It is probably Blackstone, in his Commentaries on the laws of England, speaking of the legal period, which commenced in the time of Edward I., when enumerating the great law writers of that reign, mentions Britton, Fleta, and Hougham, as eminently conspicuous. The commentary under the title Fleta was evidently written at the reign of Edward in 1540.

But Nichollson, in his invaluable work, "The Historical library," observes, that the writer is unknown; that it was some person resident in the Fleet, and who thence adopted the name of the place as a title for his work. Yet Morey says the authors of it were some lawyers, who wrote it in the prison of the Fleet, where they had been confined for the crime of concussion, the particular nature of which has been discussed at large by the learned Selden. Grand Dict. Hist.

Fletcher, Giles, brother of Richard, bishop of London, was born in Kent, and educated at Eton school, whence, in 1565, he was elected king's scholar at Cambridge. He obtained at the university the character of an accomplished gentleman and an excellent poet, and after he had taken the preliminary degrees, he took that of doctor of laws in 1581. He was employed by queen Elizabeth as commissioneer in Scotland, Germany, and the Low Countries, and in 1588 was sent ambassador to the Emperor Theodore Ivanovich, with the charge of re-establishing the commercial concerns of the Russian company, which had fallen into decay. His reception at first was very unfavourable, but he at length succeeded in concluding an advantageous treaty, by which the former privileges of the company were renewed and confirmed. After his return, in 1591, he published an account "Of the Ruffe Commonwealth," which contains many curious and authentic particulars of that country, then little known to the rest of Europe. The freedom of certain remarks and strictures in the book caused it to be suppressed, through fear of giving offence to the reigning prince, but it is to be found in Hakluyt's collection. After this he was made secretary to the city of London, a matter of request, and treasurer of St. Paul's church.

Fletcher, John, a dramatic writer, son of Richard Fletcher, bishop of London, was born in Northamptonshire in 1570, and received his education at Cambridge. It does not appear that he followed any profession except that of a poet, in which capacity he was the insepable companion of Beaumont. He died of the plague in 1625, and was buried in the church of St. Mary Overy. Several of the plays of Beaumont and Fletcher were published during their lives, and various editions have been given of them in a collective form. The ten volumes edited by Theobald, Symonds, and Seward.
Seward, in 1751; and the same number published by Colman in 1778, a e ecleemed the most correct. The poetical powers of Fletcher are advantageously displayed in a piece which was certainly his own unaided composition, entitled, "The Peculiar Stephenresa," a dramatic pastoral on the model of the Italian. "It poifsibly," says an able critic, "many beauties, and has been honour'd with a chaste imitation of some of its passages by Milton in his Comus." Its plot, however, is defective and unpleasing, to which may be attributed its unfavourable reception on the stage."—BLO.

FLETCHER, PHEINEAS, son of GILES, was educated at Eton school, and from thence he was elected to King's College, Cambridge, in 1600. In 1621 he obtained the liviry of Holgate, in Norfolk, on which he appears to have passed the greater part of his mature life. Little more is known of this person but that he was addicted to poetical composition at a very early period. His principal works are "The Purple Island," "Peculiar Elogues," and "Miscellanies," all printed together at Cambridge in 1633. An edition of his Peculiar Elogues, with some of his Miscellanies, was published at Edinburgh in 1784; and all his poetical compositions have been received into Dr. Anderson's collection. He wrote a book in prose, entitled "De Literatis Antiquae Britanniae."—BLO.

FLETCHER, ANDREW, son of Sir Robert Fletcher of Saltoun, in Scotland, was born in 1673. Being left fatherless while he was a child, he was placed under the tuition of Dr. Gilbert Burnet, then rector of Saltoun, from whom he imbibed the learning, piety, and attachment to the principles of a free government, by which that eminent prelate was distinguished. He spent some years of his youth in foreign travel, and first appeared as a public character in the station of a commissioner for East Lothian in the Scotch parliament. He became so distinguished by his opposition to the arbitrary measures of the court, that he thought it advisable to withdraw to Holland, and upon being cited to appear by a summons from the lords of the council, which it was known he could not obey, he was outlawed, and his estate confiscated. In 1683 he came over to England to aitift, with his friend Mr. Baille of Jerivwood, in the congratulations held among the friends of liberty in England and Scotland, to concert measures for their common security; and by his prudence and address he avoided giving any pretext to the ministry for his apprehension. He returned to the continent, and in 1688 engaged in the enterprise of the duke of Monmouth. He landed in the west of England, but was obliged to quit the country again on account of a difpute which he had with a rude, vulgar, and violent man, whom he shot dead. From England he embarked for, and landed in Spain; he afterwards passed into Hungary, where he engaged in the war with the Turks, and distinguished himself by his valour and skill. The interest which he took in the fate of his country soon brought him back to join in the conferences which were held among the Scotch refugees in Holland, for the purpose of effecting a revolution. When that event took place, he returned to Scotland, and resumed the posifion of his estate. He was a member of the convention for the settlement of the new government in Scotland, and in all his political conduct he shewed himself the zealous affeter of the liberties of the people, without any regard to party distinction, and free from all views of his own interest. In 1698 he printed "A Discourse of Government with Relation to Militia," also "Two Discourses concerning the Affairs of Scotland." In one of these he suggests a plan for providing for the poor by domestic slavery, which, to lay the least of it, comes with a very ill grace from one so zealously attached to the cause of liberty as Mr. Fletcher. When a bill was brought into the parliament of Scotland for a propfly to the crown, in 1763, he moved, that previously to this or to any other bullions, the house should consider what acts were necessary to secure their religion and liberties in case of the queen's death, and he proposed various limitations of the prerogative, which were received in the "Act of Security," p. 6 through his exertions into a law, but not followed by the subsequent union. Of this last measure he was a zealous opposer, and made many speeches on the subject; but it was not a matter to be decided by eloquence, or else that of Fletcher, which was more nervous and correct than that of any other speaker in the Scotch parliament, enforced by his known patriotism would have had much weight. He died at London in 1716. His publications, and some of his speeches, were collected in one volume by the author, entitled, "The Political Works of Andrew Fletcher, Esquire." As a writer he possessed great power: his style was periphrastic, elegant, and energetic, and his mind was enlarged by acquaintance with the best authors, ancient and modern, and by every species of knowledge which forms the politician. "He was," says one of his biographers, "a true friend, but an irreconcilable enemy; would have his life readily to serve his country, and would not do a base thing to save it. His thoughts are large as to religion, and could never be brought within the bounds of any sect, nor will he be under the distinction of whig or Tory, saying these names are only used to cloak the knavery of both parties."—Hume.

FLETCHER, in Geography, a township of America, in Franklin county, Vermont, containing 200 inhabitants, having Cambridge on the S. E. and Georgia on the W.

FLETCHER'S Noo, a cape of America, on the coast of Main. N. lat. 43° 25', W. long 70° 29'.

FLETZ, or Flötz, among German miners, a term of high antiquity, generally denoting a layer of any kind of rock, the position of which approaches the horizontal line. The word, thus applied, being vague and insignificant, it would fearlessly claim our notice in this work, but for the more fixed and scientific meaning it conveys in the compounds "Flötzen Mountains" (Flöz Gebirge), and "Flötz-rocks" (Flöz-gelber-arten), which terms, as proceeding from the country which may properly be called the cradle of mineralogy and geology, are now inserted into the technical definitions of most European languages. We too (in the succeeding article) have adopted the prefix "flötz," in preference to "secondary," which latter, (not to mention other objections against it,) cannot be adopted by those who, with Mr. Werner, admit a formation of rocks, intermediate between the primitive and secondary rocks of other geologists.

With regard to the spelling here proposed, it is to be observed that, although "fletz" with a diphthong may be conformable to the rules of modern German orthography, yet the ancient mode of spelling the word is "flötz," and this we prefer, partly because the sound of the letter ë, as pronounced by the Germans, is foreign to the English language, and partly because the old spelling and pronunciation (which latter is still heard in several parts of Germany) are more correct, as they approach nearer those of other words, which in various dead and modern languages equally convey the idea of a horizontal even plane, such as natio, latit, fluit, plat, flot, etc.

Flötzen Mountains, Flötzer-Rocks; Flöz-Gebirge, Flötz-gebirge-arten. Germany. The mountains and rocks to which these names are given by the German school of geology, are obviously of much more recent origin than those called primitive (see Rocks, Primitive). They bear a more diffusely
From the alluvial, the fletz rocks are distinguished by all those positive and negative characters that bespeak an earlier origin, being the result of a general revolution that extended over the whole surface of the globe; while the former can, without any gratuitous assumption, be considered as partial formations produced by the drift of all of the others: they have originated, as it were, under the eye of the geologist, who discovers in their later substance, in the compounds of loam, marle, &c., the remains of substances known to him, as belonging to the present creation, and swept together by partial inundations, by overflows of rivers, &c. (See Rocks, Alluvial). From the primitive, the fletz mountains are in general easily distinguishable: for while the former, (such as the Hartz, the Saxon Erzgebirge, a great part of the Fichtelgebirge, &c.) usually tower to a majestic height, divided up to their summits by ravines and chains, the fletz mountains are generally of a less bold and steep aspect, and run along in more uniformly undulated ranges. Viewed on a large scale the fletz-rocks are much more compound than the primitive; but they appear much less so, and often of a perfectly homogeneous nature, when viewed in small masses. Though the fletz are already seen to occur in the primitive rocks, yet this formation owes its principal character to the siliceous and argillaceous earths, (from granite to clay-lime); while calcareous with argillaceous earth, appear to be the leading features in the composition of fletz-rocks. Very characteristic of these rocks are the petrifications with which they abound, and which decrease in number as the fletz approaches the primitive formation, where they are no longer observed. These petrifications consist in parts of vegetables, and shells of various marine animals, most of the prototypes of which no longer exist; and frequently one particular species occupies a stratum throughout a considerable tract of country, while the adjoining stratum is floored with a species totally different from, and unmixt with the others. Bituminous fossils, of rare and ambiguous occurrence in primitive rocks, have their principal occurrences in fletz mountains. Thus coal, so frequent in the comparatively new formations, can scarcely be traced higher than to the oldest sand-lime, where it becomes infrequent and dispersed. But as a feature of the mountain under consideration, it is a stratification, marked by many peculiarities not observable in other formations. The fletz generally run parallel with one another; their position, though sometimes feebly deviating from the horizontal, is often visibly inclined; they accompany the sides of primitive mountains, either partially, or they surround them; while the summit of the latter, projecting over the overcomposing fletz-rocks, will often make the superficial observer suppose to see a primitive rock superincumbent on a more recent formation. Thus, for instance, we have the Schweiterleng, an old porphyry mountain, near Wettin, in the district of Halle, rising in the inclined of an infolded mass out of the surrounding fletz strata. It has been said above that fletz mountains are less rapidly rising, and it may be added that they do not generally attain any considerable height, if we except some of those belonging to the cliffs which Mr. Werner calls the newest fletz-trapp formation, comprising basalt, wacke, &c., rocks, some of which, by other geologists, are classed with the genuine volcanic productions. If, however, the fletz mountains can be said in general to possess many characters that keep them distinct from the primitive, this is not strictly applicable to all of them; for there is a small series of rocks of an ambiguous nature, which, being often intermediate between the two formations, and participating of the characters of both, have frequently embarrassed the framers of geological arrangement, being formed by Mr. Werner into a particular class, under the name Übergangsgebirge, (see Transition Mountains); a distinction which is not admitted by Mr. Voigt and others.

As the ideas which the two last mentioned geologists entertain relative to the origin of the fletz mountains have regulated their classification of the rocks belonging to that and the transition formation, it will be proper, before we proceed, to give a short outline of their respective theories, as far as they relate to the subject under consideration. Werner accounts for the difference that subsists between the rocks of his three first classes of the aqueous formation, from the oldest granite down to the newest fletz-lime, by the gradual diminution of the water on the surface of the earth. At that period, when the earth was in a chaotic state, and entirely encompassed by the ocean, which contained its first matter, the primitive mountains were formed by the laws of crystallization. As the volume of the water gradually diminished, and dry land took its appearance, in that, when the earth pafted into an inhabitable state, a series of rocks originated, which participate, in some measure, of the nature of the primitive, at the same time that they display the first traces of remains of simple organic bodies that inhabited the sea, and of mechanical deposition, which could take place only near the surface of the water. The increase of these mechanical depositions corresponded to the diminishing level of the ocean, from the transition to the more recent periods, each of which furnished the successive fletz-litha with their peculiar contingents of organic bodies, most of which remain only as petrifications. It is in this manner that the celebrated professor of Freiberg assigns to all the known rocks their respective places in his arrangement, the whole forming an uninterrupted series from the granite to the youngest of the alluvial mountains. There is, however, another and essential difference of rocks allied to those of the fletz formation, and which, (being superimposed promiscuously on other formations, from the primitive to the most recent,) is kept separate by Werner, as one of the subordinations of their class; to this belong basalt, the kindred wacke, porphyry-lime, amygdaloid, and other rocks enumerated by Werner as members of the fletz-trapp formation. The whole of this is supposed by him to owe its origin to a posterior deluge, or a sudden rising and retiring of water, and is considered as the newest member of the fletz formation.

Mr. Voigt, who has given a classification of rocks, though he rejects the transition period adopted by Mr. Werner, still divides the fletz rocks into those of older, and those of newer formation. As his ideas on this subject are but little known to the English reader, we shall here give a short sketch of his theory, omitted under the article Earth. His hypothesis is, that in its primordial state, our planet was entirely encompassed by water, in which, without having either mountains or valleys, it floated like the yolk in the albumen of the egg. Of the substances that composed the earth in this state of submission, some were apt to undergo fer-
fermentation, to ignite, to give out elastic vapours and gases, and to produce explosions. It was by these energies that masses were raised from the bottom of the ocean towards its surface, where they formed islands, which afterwards constituted the principal ranges of primary mountains. The body of water displaced by these elevated masses filled up the space the latter originally occupied; and this diminution of the water was the cause of the appearance of an additional portion of dry land. Of the detritus of these primary mountains, and by the deposition of mineral substances, still divided or floating in the ocean, the flëtz mountains were produced, which formed layers surrounding the original islands.

As according to this theory (which the reader will observe is not unlike that of Lazzaro Moro), no considerable time intervened between the formation of the primary and flëtz mountains; it is no matter of surprise that the newest of the former should show considerable affinity to the oldest of the latter formation; and that intermediate kinds of rocks should have been formed, which appear of an ambiguous origin only when viewed out of connection with the rest.

But, though our author does not admit transition rocks in the sense in which this word is taken by some geologists, he nevertheless thinks that there are flëtz rocks, that, strictly speaking, might be referred to the primary; namely, such flëtz of lime and sand-flëtz, that, according to his theory, were raised at the same time with the primary mountains on which they were deposited at the bottom of the sea. To this division belong those flëtz which are sometimes observed in such places, which, from their elevation, cannot be supposed to have been reached by the water when the regular flëtz rocks were deposited. Thus, for instance, we see on the primitive granite mountains of the Hartz, not far from Clausthal, a calcareous rock called the Hüttengesteine, which constitutes a reef almost entirely made up of corals, which prove its having been formed at the bottom of the ocean. Not less remarkable in this respect is the Hanskühlcn-burg, a huge sand-flëtz rock, on the high Bruchberg, one of the Hartz mountains, at an elevation which precludes the idea of its having been produced at the same time with the younger flëtz-sand-flëtz, from which it differs also in its external characters. In the same manner, our author refers to the older flëtz rocks those flëtz that are met with on the declivities and in the chains of high primitive mountains, at a greater elevation than the younger flëtz formation reaches; and which were deposited soon after the summits of the primitive mountains were raised above the surface of the ocean. The first of Voigt's older flëtz-rocks is what he calls the old sand-flëtz, the fame which has been above alluded to, and which is totally different from that of Werner, as we shall see hereafter. The old sand-flëtz of Voigt is of a much rougher nature than the common flëtz sand-flëtz, and always occurs in very elevated situations.

2. The principal coal formations, confided by Werner as of much later date. The geognostic relation of this interesting inflammable substance, much as it has been written on it, is still involved in obscurity; more recent observations appear, however, to be in favour of Voigt's ideas respecting it.

3. Slate-clay (Schieferthon) nearly of the same age with coal and its sand-flëtz, it being found alternating with these latter, and in general occurring under similar circumstances. In this rock are found the most perfect impressions of vegetables which the earth produced in its primordial state, wholly belonging to the animalculeous and terraceous, the former of which required nothing for their growth but water, the latter nothing but naked rocks.

4. The sand-stone, as Mr. Voigt calls it, of yellowish, and sometimes orange-grey colour, coarse grain, considerable hardness, and a multitude of petrifications. It never occurs distinctly stratified, but generally as infiltrated amorphous masses and rocks in more elevated situations. The highest masses are seen at Reichen in the forest of Thuringia, where they rest on high porphyry mountains; and lower down it frequently accompanies those mountains in grotesque groups of mafly rocks. Lasso has described the same kind of lime-flëtz in his work on the Hartz mountains. Some kinds of rocks, described by pupils of Werner, as transition lime-flëtz, appear to be the same with the oldest lime-flëtz of Voigt.

From what has been said, (and what remains to be said under the article Transition-Rocks), it appears that, however the followers of different geological systems may be agreed with regard to the nature of primitive and flëtz mountains in general, their opinion will be found to diverge at a few points where adjoining distinct formations, by mutually borrowing of each other geognostic and orceognostic characters, battle disimilification, and cause the orients to draw lines of demarcation that are more or less derived from hypothetical propositions.

In order to illustrate the different flëtz of the flëtz formation more generally acknowledged as such, we shall call a view over the tract of country extending in an eastern direction, from the foret mountains of Thuringia to the Hartz, and enumerate them in the order in which they succeed each other, according to the observations of Mr. Voigt. This successive, however, should not be supposed to prove exactly the fame in all parts of the world: the fact is, that often entire flëtz, especially subordinate ones, are wanting without being supplied by others, and sometimes flëtz are substituted in their room that are foreign to other countries, such as the salt rock-salt flëtz in Hungary, Poland, the chalk in England, &c.

The flëtz, which almost without interruption fill up the space between the two above-mentioned ranges of mountains, whose distance from each other is about twenty-two miles, are the following:

The old red sand-flëtz of Werner, called by the miners of Germany, das rothe Tödt-legendne (i.e. the red dead or barren rock). It occupies the lowest situation of all the newer flëtz rocks. In the Hartz it reds on grey-wacke, one of the transition rocks of Werner, but referred by Voigt to the primitive. (See Grey Wacke.) Where this sand-flëtz hawks out it appears in pretty high mountains, and often covers considerable tracts of sand, as, for instance, at Eifenach, Eisleben in Mansfield, &c. It is often difficult to distinguish it from the newer sand-flëtz, when not viewed in its connection with the formations that accompany it (See Sand-stone); but in general it is much harder, and of a coarser grain than the latter, often appearing as conglomerate; and its colour is usually brick and ochreous red, from which its name is derived; but is also found grey. The coarsest grained often alternates with fine grained varieties, in layers of various thicknesses. Mr. Jäsmann intimates that, if the observations lately made in Germany by Karlken, Buch, and others, are correct, much of the red sand-flëtz of England will be found to belong to this old sand-flëtz formation. This flëtz, in the above-mentioned tract of country, is regularly followed by

Biminusius Marl-Flëtz, for the description of which, see Marl-Flëtz, Biminusius.

The most distinct line is drawn between this and the preceding flëtz. It bears evident marks of being deposited on the old red sand-flëtz from a calm and undisturbed fluid. Impressions of fishes are frequently seen in it, but none of vegetables. It is rich in metals, especially copper ore, whereas
whence the appellation copper slate gneiss; sometimes the metalic veins, those of copper and silver, penetrate through the bituminous slate, and form the surface of the old fan-shaped stratum underneath, which thus becomes metalliciferous. (See Sand and Ore.) The bituminous slate is classed by Werner under his first lime-stone formation, as is likewise the Zechstein, which rests on the preceding. This is a coarse splinterly, alb-grey compact lime-stone (in some places it approaches the nature of undated marble); it does not pass over into the adjoining slates, but is separated from them by a marked line. It contains neither bitumen nor metals, nor impregnations of fishes as the bituminous marl-stone. This stratum, and the two following, are wanting in some parts of the forest of Thuringia, but their places are supplied by a bed of yellowish-brown lime-stone, accompanied by considerable beds of brown iron-stone, and containing a great quantity of the petrifaction called Ammonia gryphus. The zech-stein is succeeded, upwards, by a stratum of Gyppum, called the first flint-gypsum by Werner. It is composed of granular and compact gyppum, of a white and grey colour, often variegated and veined, penetrated by bitumens, and containing fossiliferous gyppum, flint-stone, &c.; but petrifactions are seldom found in it. See GYPSUM, Compacted, Granular.

By what chemical combination it happened that the zechstein-stratum, being a carbonate of lime, was immediately succeeded by a combination of lime with sulphuric acid, is a question not easily to be answered; but the circumstance is the more striking, as this petrifaction is immediately succeeded by another carbonate, called Silt-stone. a stratum confused by Werner as subordinate to his first flint gyppum (See SILT-STONE.) On this rests another, Sand-stone, which appears to belong to the variegated or second sand-stone formation, as characterized by Werner. Its colour is partly yellowish-white, partly light grey-brown and red. This is succeeded by another stratum of Gyppum, being the second flint-gypsum, which, though in some parts of Thuringia it assumes considerable thickness, is entirely wanting in others, as for instance in the principality of Fulda. But a more constant attendant on the last-mentioned sand-stone is the superimposed stratum of Clay, mostly of a brown-red colour, often intermixed with other tints, such as light mountain-green and blueish-grey. Mr. Voigt observes, that most rivers of Thuringia, Franconia, and Hesse have cut their way through the flint lime-stone, through this reddish clay and the gyppum (where they met with it) down to the last-mentioned sand-stone; and in most low grounds and valleys of these countries, the arable land consists almost entirely of that clay, which, though unfavourable to vegetation in its pure state, becomes the most fertile soil when mixed with sand, gyppum, and lime, as is the case in the neighbourhood of Erfurt, and in several other parts of Thuringia.

The common clay belongs partly to the alluvial, partly to the flint formation, and principally to that sub-division of the latter called the newest flint trap formation by the Wernerian school. The uppermost stratum, and the most considerable next to sand-stone, is Flint lime-stone. Like the sand-stone, and almost all other rocks of the flint formation, it is composed of several strata, each constituting a different variety of compact lime-stone. Those of Thuringia, according to Mr. Voigt, are, 1. A compact lime-stone of yellowish-white or blueish-grey colour, of even and earthy texture, wrought as a marble at Weimar. Except cornua ammonis, few petrifactions are found in it; but often indigene, vermilion, and carboniferous elevations are discovered on the planes of its principal fracture. 2. A faint alb-grey lime-stone, entirely composed of small petrified pebbles, and called by the provincial name of toad-eye. 3. A faint alb-grey splinterly lime-stone, with here and there some petrifaction, and also containing nodules of green flint, which, however, on account of its fracture not being conchoidal, does not answer the purpose of making ground-shells. (See Flint, Gun-Flint.) 4. Compact lime-stone, apparently composed of irregularly cubic fragments, into which it separates on being struck upon; it is by far the most common variety in those parts. 5. Lamellar lime-stone, &c. into thin layers; only found in the vicinity of Jena by professor Voigt. These five layers, constituting the above flint-lime-stone strata, follow each other, though in irregular succession. The whole formation corresponds with that of the second flint or flint-lime-stone of Werner, so called from containing a great number of petrified shells, but formed by other materials; though in the upper of the beds alb-grey petrifactions of flint, crabs, vermiculites, &c. are frequently met with. It is in this lime-stone that most caverns are found containing remains of land animals. Various distinct lime-stone formations are probably included in this; but the observations of well-informed travellers on this subject are as yet too scanty and imperfect to be turned to account by the geologist.


The principal of these formations being illustrated by the above series of strata in Thuringia, we shall here add a few words on those that are not found in that district. First, with regard to the second of Werner's formation it is to be observed, that in several countries a stratum of porous grey lime-stone is found subordinate to it, called rauch wood, which is wanting in that part of Thuringia; and the same is the case with roe-stone, confused as subordinate to the fourth of Werner's formations, and of which considerable strata are seen in other countries, though it does not appear to constitute an independent formation. The seventh formation, being the third flint sand-stone, is represented by the commentators on Werner's arrangement as a very extensive one; but its geognostic relations do not appear to be sufficiently determined. It is supposed to be of much newer origin than the other preceding sand-stone formations; it exhibits many traces of coal; is constantly of a white colour, and as negative characters are given its not containing any clay-galls, or gyppum, its not alternating with sandstone flits, or ros-stone. The hills formed by this sand-stone have a peculiar appearance: they are conical and steep, and exhibit in the variously slipped and arranged masses of which they are composed, a striking scene. "One of the most striking appearances of this kind," says Mr. Jackson, "is at Andenbuch in Bavaria, where we observe numberless cones, pyramids, and pillars, sometimes isolated, sometimes joined together, and from two to three hundred feet high, spreading over a conflagrable tract of country. In other places, caverns or grottos appear, from which there issue many flames, that give rise to waterfalls, and thus increase the beauty of this striking scene. These caverns are wide at the mouth, but become very narrow towards their further extremity, and are generally very short. This form flows, that
that they owe their existence to external agents, particularly water. A more near examination discovers, that the forms of the strata of the different isolated masses correspond to each other, which render it probable that all these cones, pyramids, and pillars, have been formerly united, and that the pendent parts of fissures have given rise to this diffusion, which has been afterwards increased by the action of the air, and by the water carrying away the softer or more loosely aggregated parts of the hard stone, and having the harder parts in these various forms. A similar appearance of faulted strata occurs near Tuns; and, from its striking resemblance to turns, is described as the remains of a great city, by some travellers who saw it at a distance. In the land of the Namequas in southern Africa, and on the banks of the Weiga, there are similar appearances. This formation passes through Saxony, Silesia, and Bohemia, and is wrapped around almost the whole of the Rieben-Gebirge.

An excellent characteristic of this land-fissure formation, as it appears in Bohemia, we prefix from the able pen of Dr. Rehbein.

Another formation, not in the above series of Thuringian fletz rocks, nor, indeed, abundantly met with in any part of Germany, is of particular interest. It is found only in connection with the fletz-syenites; and in the territory of Sames of Upper Austria may be considered as subordinate to the first fletz-limite, the principal formation of that country. It is a kind of clay, somewhat accompanied by beds of clay called by Humboldt 

*Schlacke,* which is a variety but little understood; we shall here add Buch's description of that occurring at Halländ, Ichbel, &c. in the just-mentioned Austrian territory. Its colour is smoke-grey, and it also occurs greyish-black and greyish-white, more seldom reddish-brown and tilled. It is perfectly dull, but always mixed with minute glimmering felsine particles; fracture fine earthy, and in large pieces, list conchoidal; fragments indeterminate angular. It is perfectly opaque, does not fail, is soft, approaching to very soft, rather oecile, and not particularly heavy. This kind is light ash-grey. This clay is said to become of a darker colour when exposed to the air, which is the more singular, as, according to Humboldt's experiments, it eagers about the oxygen of the atmosphere. It is quite penetrable by salt; and the small angular fragments, approaching more or less to the cubic form, are often found coated with a crust of felsine particles. Rock-felt is generally found in large masses, in low parts between mountains, or at the foot, such as in Transylvania; though very deposition of it also occur in high situations, such as at the foot of the elevated range of mountains which, to the north-west from Tibet, encompass Caucasion; a situation equally elevated with a great part of the European Alps. For a more detailed account of this interesting formation, see the article Rock Salt.

The flatz of Werners's fletz formations, that of chalk, is but little understood with regard to its geognostic relation: all we know is, that its occurrence in low situations on the sea coast, where it forms high and rugged cliffs, and its earthy aspect, b-ipsak its more recent origin. In England it occurs in considerable strata, in many cliffs and high mountains. We do not know much of its occurrence in Germany; it is, however, said to be found at Luneburg, alternating with thin strata of chalk. Chalk contains no metals except iron ores, and few petroleum have been found in it; but the nodules of flint imbedded in this rock are almost characteristic of it. See Flint.

As to the eleventh or independent coal formation, we have already occasion to mention it as one of Mr. Voigt's Vol. XIV.

older fletz rocks. We shall here add a few words on Mr. Werner's coal formation in general. According to E. Werner, who gives us an exposition of the Wernerian system, the coal-mounts (Kohlengebirge) are to be divided into four distinct formations: to the oldest belong the coal strata occurring in fletz lime-stone, as, for instance, the foot of the Besseberg, near Kripten, on the Tummers. Younger than this, but of the same age with one of the newer sandstone formations, is the independent coal formation of still more recent origin is the coal which is subordinate to the trap formation: and the newest of all is that contained in alluvial mountains. Mr. Janson, as the other hand, informs us that Werner has attested three distinct coal formations, without including the beds of coal found in sand-stone and lime-stone formations, which latter, he says, are in general of no importance. According to this new arrangement, therefore, the independent coal formation is the oldest; the second is of the newest fletz-trap formation; and the third, that which occurs in alluvial land. Again, according to later accounts, it is understood that Mr. Werner has adopted another arrangement of that formation which, according to Kriek, is that of the Kriefel, who makes the sandstone coal formation dependent on the older sandstone, and of the lime-stone subordinate to the fletz, or Alpine lime-stone. From these frequent changes it would appear that the history of the different formations of coal and their relative age are still involved in considerable darkness. What is known with certainty amounts, we suppose, to this, that coal is of early as well as of late formation; the former is found under the older sandstone, sometimes even reposing on primitive rocks; the latter, on the newer sandstone in the vicinity of the rocks that belong to Werner's younger fletz trap formation. We are happy to find that Mr. Janson has promised to publish the results of his observations on the relation in which these formations of coal stand to the other fletz rocks; and, indeed, many doubts remain to be cleared up respecting the determination of this point, as well as of many others intimately connected with the natural history of those important mineral deposits.

The last of Werner's fletz formations is called the new coal trap formation, comprising principally those enigmatic masses, known by the names of flitte, wacken, and amygdaloid rocks, which, though they contain no organic remains, cannot be ranked with the primitive, since they rest both on these and the fletz mountains; rocks which are considered by many geologists as the principal products of volcanic agency, but which, according to Werner, are the results of a deposit of the waters at a more recent period than that in which the other fletz rocks were formed. Besides the just-mentioned, the following rocks are referred to this formation: green-stone, grey-stone, pitch-stone, compact feldspar, obsidian, pumice, and those that are mechanical deposits, viz. gravel, sand, bituminous wood, brown coal, clay, and trap-nels; in which articles we refer our readers, as we have to the article Trap.

For further remarks on the subject of fletz strata, and on the order in which they succeed each other in different parts of the world, see Strata.

Not unconnected with the history of the strata of mountains, are the remarkable appearances observed by travelers under the precipices of Alpine peaks, &c. They are disturbances that have happened to the strata, after being ridged by vertical fissures; the separate sides of the fissures, which are generally filled up, do not longer correspond, the strata of the one being either above or below those of the other.
those of the other side, with which they were connected before the disturbance took place. See the articles Slip and Vein.

FLEUKAN, FlOOKAN, in Mining, denotes rubble and unconsolidated earth contained between the sides of strata vertically divided by a failure and detached. See Slip and Vein.

FLEUR-D-LESIS, FLEURETTE', FLOUROAN, and Fleury, in Heraldry. See FOERY.

FLEURENCE, in Geography, a town of France, in the department of the Gers, and chief place of a canton, in the district of Leilour, seated on the Gers; 4 miles S. of Leilour. N. lat. 42° 51'. E. long. 0° 15'. The place contains 3,621, and the canton 12,159 inhabitants, on a territory of 3,500,000, in 22 communes.

FLEURIEU, Cape, a cape on the W. coast of North America, so called by Perouse. It is supposed to be the same with that which captain Dixon called Cape Cox. N. lat. 51° 45'. W. long. 128° 55'.

FLEURIS, a term in French Myth, now obsolete. It implied florid counterpart, such as is not noted again, but compounded of notes of different value and proportion as to measure. It likewise implied the graces or ornaments of a melody when too simple. See Broderies, Doubles, Variations, and Passages.

FLEURUS, or FlOORUS, in Geography, a village of France, in the department of the Sambre and Meuse, remarkable for having been the place near which three battles were fought, viz. the first August 1, 1622, the second between the allies and the French, and the third between the Austrians and the French, in June 1754, in which the former were defeated with great loss: 6 miles N. E. of Charleroy.

FLEURY, ANDREW-HERCULES, in Biography, cardinal and prime minister of France, was born in 1537. He was educated at Paris in the Jesuits' college, and became, at a proper age, canon of Montpelier, and doctor of the Sorbonne. Possessing an agreeable person, and those manners that never fail to recommend a man at court, he obtained the poet of almoner to the queen, and afterwards to the king. In 1608, he was nominated to the bishopric of Frejus, when Lewis XIV. paid him a high compliment; "He that made you wait a long time," said the monarch, "but you have so many friends, that I was deficient you should be obliged for your advancement to no one but myself." Fleury, however, was not always pleased with his promotion, the diocese was in a distant and disagreeable country, and he became disgusted, probably, for the want of that kind of society which was conformable to his wishes. In a letter to a friend he subcribed himself, "Fleury, by divine indignation, bishop of Frejus." He nevertheless held the see many years, and on one occasion, when the allies under the duke of Savoy and prince Eugene made an invasion into France, the bishop, by his prudent conduct and engaging manners, saved his city and its neighbourhood from pillage, and pacified the generals to be contented with a moderate contribution. He was nominated by the will of Lewis XIV. preceptor to his successor, the young king, with whom he so completely ingratiated himself, as to inspire him with a profound esteem and attachment. Nor was he less anxious to pay his court to the monarch Villeroi, the king's governor, and to the regent the duke of Orleans, by the most respectful demeanor. The regent would have conferred upon him the archbishopric of Rheims, but he refused that splendid promotion, dreading, perhaps, that it might be a pretext for removing him from the person of the king. At the death of the regent, it was through his recommendation that the duke of Bourbon was appointed prime minister, though in truth it was Fleury who governed, by means of the influence which he possessed over the king's mind. This was put to the trial, when, the duke, urged by his mistrels, attempted to exclude the bishop from his private consultations with the king. Fleury immediately retired, and wrote to his sovereign a letter filled with expressions of tenderness and regret, the effect of which was such, that it was impossible to pacify the king, till he was recalled and restored to his place. From this time Fleury became chief minister, without aiming the title and apparent functions which pointed out the premier. He was created cardinal in 1736, and at the age of seventy-three devoted the remains of his life, which had hitherto challenged the public esteem, to the ungrateful toils that attend ministerial power, and at a period when the most ambitious are ready to seek reposes, he avowedly entered the lists of fame. The spirit of his administration was economy in the public revenue, and the preservation of peace. The pacific disposition of this great man corresponded with the immediate welfare of France, and he quietly left the kingdom to repair its losses, and to enrich itself by an advantageous and extensive commerce, without making any innovations. This tranquil and enterprising disposition was not calculated to gain the respect of a nation like the French, who have ever been more defirous of being thought great, than anxious to be really prosperous. Peace the cardinal could not always attain, but he terminated in three years the war of 1733 with the emperor Charles VI., and obtained for France the important acquisition of Lorraine. In the year 1741, Frederic III., king of Prussia, laid claim to four duchies in Silesia; he suddenly entered that country, defeated the Austrians near Malitz, and occupied the whole of the duchy. This victory was the signal for war to France; but Fleury, now in his eighty-fifth year, was but little inclined to relinquish the pacific system that he adored, but he was overwhelmed by the impetuosity of the marquis and chevalier de Bercy, who represented to Lewis that the period was now arrived of finally breaking the power of the house of Austria, and relieving that kingdom from its ruins; and that so favourable an opportunity never again would offer of raising the elector of Bavaria to the imperial throne. The monarch assented, and cardinal Fleury, tottering on the brink of the grave, yet still desirous of keeping his power, functioned with his name an enterprize he had never approved, and confounded to prefigure over a people whose counsels he was not permitted to direct. This war embittered the close of his life, which, however, by habitual temperance and natural cheerfulness, was protracted to nearly his ninetieth year. He died in 1743, and was buried in the church of the Louvre at the king's expence. In private life he was simple and modest, content with a moderate income, and remote equally from avarice and ostentation. MORERI. Histoire de France.

FLEURY, CLAUDE, was born at Paris in the year 1640. His father was an esteemed advocate, and he intended his son for the same profession. Claude, indeed, was admitted an advocate of the parliament of Paris in the year 1658, and from this period, for the next nine years, he diligently applied himself to the study of jurisprudence, and the belles lettres; after this he determined to embrace the ecclesiastical state. To forward himself in this new career, he attended the conferences which the celebrated Bossuet held at his house on the scriptures, and on subjects of religion and literature. During his interviews with this excell-
excellent man he translated his well-known work, entitled, "The Explication of the Catholic Doctrine." He soon acquired a high character for abilities and literature, while he was equally the object of respect for his piety and virtues. In the year 1651, he was chosen preceptor to the princes of Conti, and afterwards enamored the same character with respect to the count de Vermandois, the favorite natural son of Lewis XIV. In the year 1689, the king fixed upon him the illustrious prelate to be associated with the great Feron in the education of his legitimate offspring, and made him sub-preceptor to his grandsons, the dukes of Burgundy, Anjou, and Berry. In the year 1696, he was admitted a member of the French academy, at the meetings of which he ascribed often as his other duties and engagements would permit. He had not been overlooked by the king in church preferment; but being a very disinterested man, he was content with comparatively small emolument, and sought nothing for himself till the priory of Argenteuil became vacant, which, from its proximity to the king's residence, was a most desirable retreat for study with the reach of desirable sources of information. This benevolence the abbé Fleury obtained from the king without difficulty; at the same time he resigned an abbacy into the sovereign's hands which he had held before. In his retreat at Argenteuil he continued till the year 1712, when he was drawn from it by the death of Orleans, the regent of the kingdom, after the death of Lewis XIV. to occupy the place of confidant to the young king. His own infirmities, and the intrigues of the Jesuits, obliged him to resign his office in the year 1722, and in the following year he died, leaving behind him a character estimable for extensive learning, firm and nice integrity, true modesty and candour, great purity and simplicity of manners, and ardent and unalloyed piety. He was author of numerous works of merit, but his most considerable and important, the fruit of thirty years study, was his Ecclesiastical History, in 20 vols. 12mo., of which the first was published in the year 1691, and the last in the year previously to his death. This work has been published in England, in seven volumes. It contains the history of the Christian church, from the earliest times to the council of Constance in 1414; his facts are collected with great industry and impartiality from the best authorities, and they are, in general, combined in a simple and unornamented style. Morel. Hist. de France.

FLEURY, in Geography, a town of France, in the department of the Loire; 2 miles N. of Orleans. Also, a town of France, in the department of the Loire; 4 miles N.W. of St. Pol.

FLEWS, in Rural Economy, a name sometimes provincially applied to the phlemes employed in bleeding cattle.

FLEXIBLE, in Physics, is applied to bodies that are capable of being bent, or changed from their natural form and direction. A body is not capable of being inflected or bent, unless the whole thereof be at rest. In bending a body, it constitutes, as it were, two levers; and the point it is to be bent is a fulcrum. Hence, as the moving power, the farther it is from the fulcrum, it acquires a greater force; the nearer the flexible body is, the easier it is bent.

FLEXION, in Anatomy, the act of bending, or the attitude into which any part of the body is brought by the action of the flexor muscles. When the parts composing an articulation are so situated with respect to each other, as to form one straight line, the joint is said to be extended; when they are moved so as to form an angle with each other it is bent. Some joints, as those of the hip, knee, and elbow, admit of being bent only in one direction; and from this bent attitude, they can be moved in the opposite course only so far as to bring the two parts of the limb into the same straight line. In other cases, as at the wrist, motion is almost equally free in both directions, from the attitude in which the limb describes a straight line. Yet here the term flexion is confined to one of these motions; and the other is called extension, although the joint is not then straight.

FLEXTOR, a name given to those muscles, particularly of the wrist, fingers, and toes, which have the office of bending those organs; they are the antagonists of the extensors.

FLEXTOR brevis minimi digiti manus; flexor proprius; flextor palmaris Alb; capro-metacarpian. This is sometimes wanting, and in all cases it is a very small muscle. It arises from the annular ligament and os uncinatus, is situated at the side of the adductor minimi digitii, and inserted in company with it into the outer and anterior part of the last phalanx of the little finger. It is covered by the skin, and covered by the palmaris brevis, and covers the adductor oss metacarpi minimi digitii. It will bend the first phalanx of the little finger on the metacarpus.

FLEXTOR brevis minimi digitii pedis; palmaris minor of Winning; tarso phalangien du petit orteil. This muscle, situated within the adductor minimi digitii, has an elongated form, and is thicker in the middle than at the two extremities. It is attached, by means of aponeurotic fibres, to the under surface of the radial extremity of the last metatarsal bone, and to the first of the peroneus magnus. Advancing forwards, it first increases in size, and then diminishes again, and is fixed to the metatarsal extremity of the first phalanx of the little toe, adhering closely to the joint. It is covered by the adductor, and by the palmar fascia; while its superior surface corresponds to the last metatarsal bone, and to the interosseous muscle of the little toe. It bends the little toe on the metatarsus.

FLEXTOR Carpi radialis brevis; Flextor, Carpi radialis longus. See Carpi.

FLEXTOR, Carpi radialis brevis. See Carpi.

FLEXTOR brevis pollicis manus; thenar of Winning; carpophalangien; is a short muscle belonging to the ball of the thumb, and placed within the opponens pollicis. It has two origins, one from the annular ligament and os trapezium, the other from the os magnum and the third metacarpal bone. The two fleshy portions of which it consists run parallel to the metacarpal bone of the thumb, and unite at the opposite end, still leaving a channel between them for the tendon of the flextor longus. It is inserted into the two fleshy bars of the thumb, being connected to the abductor and adductor muscles of this organ. The adductor pollicis, the skin, the tendons of the flextor longus, that of the flextor profundus, and the two first lumbricales, cover this muscle externally. It covers the first metacarpal bone, the tendon of the flextor carpi radialis, and the first interosseus. This muscle will bend the articulation between the metacarpal bone and the first phalanx of the thumb; and it will also draw the metacarpal bone towards the carpus.

FLEXTOR brevis pollicis pedis; flextor brevis pollicis pedis; thenar; tarso-phalangien du pouce; a short and thick muscle,implead behind, and bifurcated in front, and placed on the inferior surface of the first metatarsal bone. It arises by a flattened, but clearly marked tendon, from the under surface of the os cunis and two of the cuneiform bones, and the ligaments which join them. It is also attached to the plantar fascia, where that covers the flextor brevis digitorum
FLEXOR.

The flat fibres, collected into a thick fasciculus, marked below with a groove for the tendon of the flexor longus, proceed forwards to the great toe, and are inserted in two divisions. The inner and largest, closely connected to the abductor, is fixed with it by tendinous fibres to the internal fascioid bone, and to the corresponding extremity of the first phalanx. The external, which is thinner, is fixed to the external fascioid bone. Both are directly attached to the synovial membrane of the articulation, which joins the great toe to the first metatarsal bone. Its upper surface is covered by the deltoid of the humerus, and then from the corresponding ligament, and from the coronoid processes of the ulna, by short aponeurotic fibres; 2dly, from a septum which separates it from the flexor carpi ulnaris; 3dly, by tendinous fibres from a considerable portion of the front edge of the radius, between the supinator brevis and the flexor pollicis longus; 4thly, from septa which separate it from the flexor carpi radialis and palmaris longus. From the origin just enumerated, a thin portion of muscular fibres is produced; but the muscle grows thicker towards its middle, runs in a direction parallel to the bones of the fore-arm, and divides into four flat fibrous portions, corresponding to the four fingers; of which, the two belonging to the middle fingers are the most superficial, and those of the fore and little fingers the most deeply seated; the latter is the smallest. These end in tendons proportioned to their bulk; which are completely disengaged from the muscular fibres at the annular ligament. The four tendons, connected together in the manner which will be presently explained, pass in the deep channel formed by the annular ligament, in front of the tendons of the profundus, separate as they proceed, and continue their course towards the fingers under the palmar fascia. They become broader and thinner, enter the tendinous sheath of the fingers, and each presents, at the commencement of the sheath, a concavity adapted to the corresponding tendon of the flexor profundus. As the tendon passes over the first phalanx, it divides into two portions, which separate to allow the passage of the tendon of the profundus, then unite together behind that tendon, so as to form a channel, with its concavity in front, lodging the tendon of the profundus; and afterwards separate again to be implanted, distinctly from each other, in the lateral and anterior margins of the second phalanx.

Thus each tendon is first concave posteriorly, where it lies on the tendon of the profundus; then presents a large flat for the passage of the latter; and afterwards concave anteriorly, from the two sides of the flat uniting below, and then ends by a double inflexion in the front.

On the fore-arm, the posterior surface of this muscle is in contact with the profundus, the flexor longus pollicis, and the median nerve; while its anterior surface is covered by the pronator teres, flexor carpi radialis, palmaris longus, and the fascia of the fore-arm. It covers the profundus and lumbricales of the hand, and is covered by the annular ligament and palmar fascia. In the fibrous sheath of the fingers, it is placed first between the sheath and the tendon of the profundus, and lower down between the latter and the bone.

FLEXOR digitorum profundus; profundus, Alb.; flexor perforans; cubito-tarsionis; flexor superficial profund. This muscle is situated in the fore-arm, under the former, which it very much resembles. It is thick, flattened, elongated in its form, flatly above, and tendinous below. It arises, 1st, from the aponeurosis extended from the flexor carpi ulnaris to the ulna, and from the inner surface of that bone in one-third of its length; 2dly, from the anterior surface of the bone for three-fourths of its length, next to the elbow, and from the corresponding portion of the interosseous ligament, by aponeurotic fibres. Smaller at its origin, it twines in the middle, and diminishes again, dividing into four more or less distinct portions, terminated by four tendons, which are at first concealed by the flat fibres, but become entirely disengaged at the annular ligament, where they are closely connected by cellular substance. They pass in the deep channel of the ligament, behind those of the flexor pollicis, to pass as they proceed into the hand, give origin to the lumbricales, enter the tendinous sheaths, perforate the tendons of the flexor pollicis, and lie in the channels formed on the anterior surfaces of the first phalanges. Each tendon terminates in a slightly flattened form, by an insertion in the anterior surface of the little phalanx.

In the fore-arm this muscle is covered by the flexor carpi radialis, the flexor sublimis, the median and ulnar nerves, and the radial artery; and it covers the surface of the ulna, the interosseous ligament, and the pronator quadratus. The bones of the carpus and metacarpus, and the interosseous muscles, lie behind it in the hand; and the lumbricales and tendons of the sublimis are before it. In the fingers, its tendons lie on the bones, being covered by the tendons of the sublimis and the fibrous sheaths. It is furnished with certain synovial membranes, common to it with the preceding muscle.

The annular synovial Membrane.—On cutting the annular ligament of the hand, and lifting up the subjacent packet of tendons, we observe a cavity terminated by a cul-de-sac above and below, and formed by a membrane, which envelops the tendons of the flexor sublimus and profundus of the flexor longus pollicis, and the median nerve; and which is spread over the surface of the annular ligament and the carpal ligaments. This membrane connects all the parts into one fasciculus, lends numerous folds between them, is very soft and yielding, but contains a little synovia, that a doubt may be entertained whether it should properly be regarded as a synovial membrane. Yet its office and use are exactly the same as those of the bursa mucoce; it enables the tendons to play easily in the channel of the annular ligament. The latter expands the tendons in their proper situation; they would otherwise start up from the wrist when the hand is bent on the fore-arm, and describe the chord of an arc formed by the fore-arm, wrist, and hand.

Synovial Membranes and fibrous Sheaths of the Fingers.—These membranes are expanded on the tendons of the two flexor muscles just described, and on a canal containing them, formed partly of bone, and partly of a strong fibrous substance. The anterior concave surface of the phalanges, and the front of their articulations, form the bony portion of the canal. The fibrous part is a dense strong layer, attached to the sides of the bony channel, and terminating below by a connection to the flexor profundus. Thus the cavity ends in a cul-de-sac. The sheath is very thick and strong
FLEXOR.

strong at the middle of the first and second phalanges, and composed of semicircular fibres of cartilaginous funnels; the flexor profundus is thinner, and composed of decussating fibres. A synovial membrane lines this cavity, and is reflected at its commencement over the tendons, so as to form here a cul-de-sac. The tendons are completely covered by this sheath, being lubricated, as well as the containing cavity, by a synovial fluid: there are, however, one or two slender vascular threads going from the sheath to the tendon. The use of this sheath is the same with that of the annular ligament, viz., to confine the tendons in their situation. When it is divided in the dead subject, and the muscles are drawn so as to bend the fingers, the tendons immediately start up from the bones. As they move considerably within the canal during the motions of the fingers, the necessity of the parts being lubricated by synovia is obvious.

No similar apparatus belongs to the extensor muscles of the fingers; because these members cannot be moved in that direction beyond the point at which they form straight lines with the hand, and their extensor tendons do not consequently admit of displacement; which would be prevented too by the attachment of the lumbricales and interossei to these tendons. At the wrist the extensor tendons are confined as well as the flexors; because the hand can be moved in this direction beyond the straight line, and the tendons would be subject to start from the bones.

The lumbricales muscles are small, slender, and elongated muscular fibres, so named from a comparison to earthworms. Their number is four, and they are designated by numerical epiteths, counting from the thumb to the little finger. They are placed in the palm of the hand, and derive their origin from the tendons of the profundus. The first arises from the anterior and radial side of the first tendon, and the succeeding ones from the bifurcations of the tendons, so that each of the latter has an attachment to two tendons. They accompany the tendons towards the fingers; are small at first, then grow larger, and afterwards contract again, and end at the first phalanx in small flattened tendons. These turn round the articulation, which joins the metacarpus to the phalanges, and go towards the back of the fingers. The expanded tendons are connected to the intersosseus, and are joined by a broad surface to the edge of the extensor tendons. They then run along the side of the fingers, and terminate by an insertion at the back of the joint of the first phalanx. The first lumbrical runs along the radial side of the first, the second along the anteroposterior side of the second, the third along the ulnar side of the same tendon, and the fourth along the lateral side of the last finger. The middle or the ring-finger may have a lumbrical on each side, and then the little finger alone. They are covered by the flexor sublimis, the palmar fascia, the digital nerves and vessels, and lie upon the intersosseous muscles. In the fingers their tendon covers the phalanges, and is covered by the skin.

The flexor sublimis and profundus, and the lumbricales, are muscles of the three joints of the fingers: the first bending the middle joint; the second, the joint; and the third, the joint that which connects the metacarpus to the first phalanges. When the two tendons have produced their effect upon the articulations to which they belong, they have the further power of bending the first joint, concurring in this office with the lumbricales. Since the latter muscles turn round the first joints, and run afterwards along the back of the phalanges, being confined in their situations by their connection to the extensor tendons, they will extend the second and third joints, although they are moved in the palm of the hand; for their peculiar course alters the direction of the force. It is necessary, in order to the flexion of the first joints by the lumbricales, that the flexor profundus should be in action; that its tendons may be fixed, so as to afford a firm point, to which the lumbricales may move the fingers. Hence, where all the three joints are bent, as in clenching the fist, in grasping a fickle, &c., the middle and last are bent first, and afterwards the first. The lumbricales, however, may be bent, while the others are kept straight; but this requires a painful effort. Here, the flexor profundus is put in action, and the extensor commissus also contracts, to prevent the fingers from being bent. By feeding in the fore-arm, we can ascertain that both the flexors and extensors are exerted on this occasion, and the effort is attended with considerable pain. Thus a fixed point is produced for the action of the lumbricales.

The sublimis and profundus, after bending the fingers, or if the fingers are kept extended, will concave more powerfully, with the flexors of the carpus, in bending the wrist. As they arise chiefly from the inner side of the fore-arm, they will also cooperate in turning the palm towards the ground, or producing the slate of pronation. Inasmuch as any of their fibres are derived from the humerus, they will have the power of bending the elbow joint. We cannot avoid noticing, even on the most superficial examination, the great superiority in bulk of the flexors over their antagonists, the extensors of the fingers. The sublimis or profundus alone contains twice or three times as many fibres as the extensor commissus; and this disproportion becomes still more striking, when we observe that the internal condyle, from which the flexor muscles arise, is very prominent, so as to give them a mechanical advantage in their action. The bending of the fingers is employed on many occasions, which require great muscular forces: the lifting of heavy weights is an example of this kind; where the ring of a weight is grasped by the fingers, and the weight elevated, it is entirely supported by these muscles. Now any individual can easily lift, in this way, from fifty to a hundred pounds and upwards, by his little finger only. In seizing and holding bodies firmly great power is required, on occasions which are constantly occurring, not merely among the laborious parts of the community, but also in those who do not depend for support on their personal exertions. In the latter, indeed, the fact is more obvious: the act of rowing, the handling of cables, the use of the hammer, the scythe, and similar instruments, all exemplify the great importance of the flexors of the fingers. No effects of any analogous description are produced by the extensors: they move the fingers, in the course of their work, but it is the flexors that make the work.
FLEXOR.

Hefty fibres descend obliquely on each side to a tendon, concealed in the substance of the muscle at first, but soon appearing superficially at the back of the muscle. The fibres of the second origin continue to enter the tendon as low as the ankle; but those of the first cease higher up in the leg. The tendon passes in a superficial groove behind the internal malleolus, separated by a fibrous septum from that of the tibialis politicus; and then passes behind the astragalus, turning afterwards horizontally forwards in the sole of the foot. It now turns rather outwards; passes under the tendon of the flexor longus politicus pedis, to which it is connected by a small tendinous chord; then becomes considerably broader and flattened, and flows the markings of a division into four portions. Here it divides into four tendons, which proceed towards the four smaller toes, entering with the corresponding portions of the flexor brevis into the tendinous sheaths of the toes, passing in the slips of those tendons, and inserted into the lower and posterior part of the first phalanges. The respective positions, the insertions, and the fibrous sheaths of these tendons are analogous to those of the flexor sublimis and profundus in the fingers; to the description of which the reader is referred.

In the leg this muscle is covered by the soleus, the facia of the leg, the posterior tibial artery and nerve; and it covers the tibia and the tibialis politicus. The tendon reflected behind the ankle, at its entrance into the sole, is contained in a fibrous sheath attached successively to the groove at the back of the tibia, to the malleolus lateralis, the astragalus, and front of the os calcis. On situating this caudal, we find it lined by a distinct synovial membrane, lubricated with a mucous fluid, and reflected over the tendon above and below to as to form two cul-de-sacs. The deepened muscles of the foot, and particularly the flexor accessorius, lie over the tendon in the sole. The adductors of the great and little toes, the plantar nerves, and the flexor brevis, are under it.

The flexor accessorius, or maffa carneus sylvi, is a thin, flattened, and rather square portion of muscle, situated under the tarsus, and above the preceding tendon. There is nothing analogous to it in the profundus of the hand. It arises, by aponeurotic fibres, from the inferior and internal surface of the os calcis; these proceed horizontally forwards parallel to each other. The muscle is inserted, either by hefty fibres or by a tendon, into the upper and outer surface of the flexor longus, where it expands previously to the division into its four tendons. It is interposed between the under surface of the tarsus and the tendon of the flexor longus.

The lumbricales pedis arise from the tendons of the flexor longus in the foot, as those of the hand do from the profundus. Their number, size, figure, and course correspond very much to those of the lumbricales manus. They are inserted, at the roots of the toes, into the metatarsal extremities of the first phalanges, attaching a thin production to the extensor tendons.

The flexor longus will bend the last joints of the toes, and afterwards the middle and first articulations. In the latter effect it is assisted by the lumbricales, which at the same time will give a flight degree of lateral motion. The toes being bent, or kept straight by the extensors, the foot will be carried back upon the leg by the flexor longus, in which case it assists the muscles of the calf. It will also aid these muscles in elevating the leg, and through it the whole body, while the foot rests on the ground; it acts therefore when we stand on our toes, as well as in the office of progression. When it bends the toes, or extends the foot upon the leg, it draws them at the same time inwards, so that the sole faces backwards and inwards, in consequence of its tendon going behind the internal malleolus. This effect is counteracted by the flexor accessorius, which draws the tendon outwards; and the toes are consequently bent without any obliquity to either side. Its action, when the body is erect and supported by the feet, fixes the sole to the ground; and by bending the front of the foot accommodates the organ to inequalities of surface. When the foot is firmly fixed to the ground, the flexor longus may draw the leg backwards upon the foot; in this way it will restore the legs to their upright bearing upon the astragalus, when the knees have been bent forwards.

Flexor longus politicus manus; radio-fons-onguien; grand fléchisseur du pouce; is a peculiar and separate flexor of the thumb, placed on the surface of the radius, and on the same level, in the fore-arm, with the flexor profundus digitorum. It has an elongated form, and is flattened at the sides. It arises from the anterior surface of the radius, commencing in a narrow pointed form just below the tubercle, and continued as far as the origin of the pronator quadratus; being also attached to a small part of the interosseous ligament. Sometimes a small fasciculus joins it from the coronoid process of the ulna. From this origin the fibres descend in an oblique direction, and terminate in a tendon lying on the front of the muscle, and passing with the flexors of the fingers, to which it is united by the synovial membrane already described, under the annular ligament of the carpus. It then turns outwards, palms between the two portions of the flexor brevis politicus, and between the two interosseous bones; it is continued over the first phalax of the thumb, and is inserted in the root of the second, being previously marked by an impression dividing it superficially into two portions. In the fore-arm, the flexor sublimis, flexor carpi radialis, supinator longus, and radial artery and nerve lie on this muscle, which covers the surface of the radius, a little of the interosseous ligament, and the pronator quadratus. In the hand, it occupies first the radial side of the channel formed by the annular ligament, and then is surrounded by the two portions of the flexor brevis politicus; being afterwards contained in a fibrous sheath. The latter is fixed to the two edges of the first phalanx of the thumb, and to the whole surface of the second, where it is continuous with the insertion of the tendon, and, together with the concavity of the bone, forms a complete canal including the tendon. It is lined by a synovial membrane, reflected at the commencement of the canal over the tendon, so as to form a cul de sac. It will bend the left joint of the thumb towards the palm of the hand; and afterwards also articulate with its metacarpal bone with the carpus. Further, it may assist in bending the wrist on the fore-arm.

Flexor longus politicus pedis; flexor longus politicus; grand fléchisseur du gros orteil. The great toe, like the thumb, has a separate long flexor, which is a thick and strong muscle, lying on the back of the fihula, and covered by the muscles of the calf. On the outside, it arises from a kind of septum placed between it and the peroneus longus and brevis; on the inside, from a more distinct tendinous production separating it from the tibialis politicus and the flexor longus digitorum; between these points, from the two inferior thirds of the back of the fihula, to which the above-mentioned sefpa are also attached. It has above a thin and pointed form, but grows considerably thicker as it descends; becoming thinner again below. A middle tendon receives the muscular fibres, appearing at the back part of the muscle, from which it is completely disengaged at the ankle. It goes behind that joint, and then turns horizontally forwards in the sole of the foot; palms over the flexor longus digitorum, being connected
connected to it by a portion of tendon, continues its course along the inner side of the foot, between the two portions of the flexor brevis pollicis, and afterwards between the two fasiform bones of the great toe. Here it generally expands, then proceeds in a narrowed form, under the first phalanx of the great toe, and is inserted into the under and back part of the second phalanx. In the leg, this muscle is covered by the soleus and by the fascia of the leg; and covers the fibula and tibialis posticus.

It then lies upon the back of the tibia, and is confined to the aflatagulus and os calcis by a fibrous sheath, lined with a synovial membrane. On the first phalanx of the great toe it is contained also in a sheath with a synovial lining. This muscle has the same uses with respect to the great toe and foot, as the flexor longus digitorum has in regard to the other toes. See the account of the action of that muscle.

*Flexor brevis digitorum pedis*; *flexor perforatus or sublimis*; calcaneo-lousongien. This muscle is placed in the middle of the sole, and is one of the superficial muscles of the foot. It is moderately thick, of an elongated form, and possessing four tendons in front. It arises from the os calcis, on the sides from two septa, which separate it from the abductors of the great and little toe, and below from the plantar fascia; proceeds in a straight direction to the end of the metatarsus; and divides into four portions which give origin to four tendons. The latter pass in the intervals of the double insertions of the plantar fascia, and enter the fibrous sheaths of the toes. At first they are concave above, to receive the tendons of the flexor longus, then they are divided for the passage of the latter, unite again, and afterwards separate to be attached by means of dilute portions to the edges of the second phalanges.

The edges of this muscle correspond to the abductors of the great and little toes; its inferior surface is covered by the plantar fascia; and the superior by the flexor accessorius, tendons of the flexor longus, plantares, and plantar nerves and vessels. By bending the toes, this muscle renders the inferior surface of the foot concave, and thus enables it to accommodate itself to uneven ground, and in a manner to grasp such unequal surfaces. This effect is much limited in the human subject by the practice of wearing shoes. By drawing the toes downwards, it tends to fix the foot to the ground.

*Flexores primi internodi digitorum*; a name given by some of the older anatomists to the lumbricales.

*Flexor secundi internodi digitorum*; is a name by which the flexor sublimis of the hand, and the flexor brevis of the foot, have been described. The flexor profundus of the hand, and the flexor brevis of the foot, have been called *flexores tertii internodi digitorum.*

*Flexor primi internodi pollicis*; is the opponens.

*Flexor secundi internodi pollicis*; is the flexor brevis.

*Flexor tertii internodi pollicis*; is the flexor longus.

*Flexor primi et secundi syllis pollicis* of Cowper, includes the adductor, opponens, and flexor brevis.

**Plexuosus Caralis**, in Botany, a zigzag stem. See Caralis, n. 3.

**Flexure, or Flexion**, in Geometry, is used to signify that a curve is both concave and convex, with respect to a given right line, or a fixed point. And the point which limits the concavity and convexity is called the point of contrary flexure. See Degradation of Curves.

Also the method of finding the points of the contrary flexure, see *Inflection.*

**Fliedethrift**, or more truly *Slidethrift*, is the game we now call *bowel-board.* It is otherwise called *flower-ground,* and is mentioned in the statute 33 Hen. VIII. cap. 9.

**Flied, or Fly**, that part of the mariner's compass on which the thirty-two winds are drawn, and over which the needle is placed, and fastened underneath.

**Flied, or Fly,** in Geography, a river or channel, which runs from the Zuyder Lee, near the coast of Friesland, into the German ocean, between the island of Schelling and Veleland.

**Flied's Bay,** a bay on the W. coast of Africa. S. lat. 14° 50'.

**Flies,** a river of Lufatia, which runs into the Spree, near Luben.

**Flight,** the act of a bird in flying; or the manner, duration, &c. thereof. See *Flying.*

The feathers of birds are admirably contrived, and fitted for the cafe and convenience of flight. See *Feathers.*

Almost every kind of bird has its particular flight: the eagle's flight is the highest; the flight of the sparrow-hawk and vulture are noble, and are fit for high enterprise and combat. The flight of some birds is low, weak, transient, and as they call it, *terra a terra*; the flight of the partridge and pheasant is but of short continuance; that of the dove is laboured; that of the sparrow undulatory, &c.

The augurs pretended to foretell future events from the flight of birds.

**Flight, in Rural Economy,** a young brood of different sorts of birds, as pigeons, &c.

**Flight.** In melting the lead ore in the works at Mendip, there is a substance which flies away in the smoke, which they call the flight.

They find it sweetish upon their lips if their faces happen to be in the way of the smoke, which they avoid as much as possible. This, falling on the graces, kills cattle that feed thereon; and, being gathered, and carried home, kills rats and mice in their houses; that which falls on the said they gather, and melt upon a flag hearth, into flot, and feed-lea.

**Flight, Caupon's,** in some Cussons, is a compas of ground, such as a capon might fly over, due to the eldest born of several brothers, in making partition of the father's effects with them, where there is no principal maner in a lordship. It is usually estimated by a bow-shot.

**Flight of a Stair-case,** See *Stair-case.*

**Flight, in Heraldry,** See *Vol.*

**Flight of an Army,** Were it impossible for each individual of an army to be sufficiently impressed with the terrible consequences of "taking to flight," such as occurrence would be extremely uncommon. Whatever may be the dangers of opposing an enemy front to front, they certainly fall very short of those inseparable from that disasters of which, while it disperses the whole, subjects each to be massacred in detail. Very fortunately for the British service, and with the most heart. It pride do we declare it, very, very few instances could be adduced wherein our soldiers have so far lost sight of subordination, or been so far overcome by panic, as to induce them to adopt this ruinous conduct. That they have been led very improperly into such situations as to render their valour and discipline of no avail, cannot be denied; but even under such disheartening circumstances their exertions have kept pace with surrounding difficulties, and taught their enemies to respect them, even when compelled to surrender at discretion.

The flight of an army is usually attended with great carnage, and with the total loss of its artillery, ammunition, baggage, flotes, treasure, &c. This rarely happens when the discomfiture is unconnected with the precipitate abandonment of positions, and of the ordnance; in this latter

*calp*
F L I G H T.

cafe, the reserve commonly offers an asylum to the defeated corps, enabling them at least to retire, if not to make head against their partners. The French, in their usual mode of vanishing over blemishes in their conduct, and of reconcing, at least to themselves, the errors of their generals, as well as the misconduct of their fieldiers, never admit the affection that their troops were "put to flight," but with much figurae observe, that "they made a precipitate retreat." This is something on a par with the defiance made by a gentleman, when having been insulted rather abruptly, was found lying in the mud; but denied having been thrown. Oh, no, "he had only dismounted, to get a better foot."

In that neat little volume, "The Packet Gunner," published by captain Ralph Willett Adye, of the Royal Artillery, is the following maxim, which cannot be too affidiously circulated, not only amongst artillers, but amongst every class of fieldiers. He says, "never abandon your guns till the last extremity. The last discharges are the most destructive; they may be your salvation, and crown you with glory."

**Flight of a Shot or a Shell.** Referring ourselves for an ample dissertation on the flight of projectiles in general, under the head of *trajectory* (which see), we take the opportunity of offering some remarks regarding those very erroneous opinions which are, in many instances, prevalent regarding the line in which a shot proceeds from the mouth of the cannon to that object towards which it is directed.

The term *point-blanc* has been greatly misunderstood. It originated in the practice among the French artillers, of firing at a *white* centre within various concentric circles of black; whereas we commonly make the centre of a target black; designating it "the bull's-eye." Therefore, when a piece was laid for the centre of the target, it was supposed to be exactly horizontal, so far as related to the line of the chance; the target being only eight feet in its whole height, which corresponded with the average height of a man on a middle-sized horse; the centre of the *point-blanc* (or white spot) was then about as high from the ground, supposing the intermediate distance to be level, as the muzzle of the gun.

Now it was found, that with the proper service-charge, a gun would at a certain distance throw the shot to the height of the *point-blanc*, and, if correctly "laid," that it would strike with exactness thereon. This gave rise to the opinion, that the shot proceeded to that distance in a direct line, after which it began to form an angle downwards. That such an error should maintain its ground while science was only in the womb of time, may not be extraordinary; but that any man who has either observed the practice, or considered the theory, should for a moment attempt to uphold so false a position, must appear absolutely wonderful. Were no such opinions extant, we should not have expended one drop of ink towards explaining the real flight of a shot, and to remove the vulgar error of what are called *point-blanc* ranges, being rectilinear.

In confuting the popular opinion on this subject, we must observe that, exclusive of the perpetual tendency of all bodies in motion, (from whatever impetus) to deviate according to the rules of gravity, (which fee), certain circumstances, particularly relating to artillery, seem to combine for the purpose of giving an acescending direction to all shots impelled by the action of gunpowder. We are to consider, that every piece of ordnance, when discharged, rises from the ground in proportion to the quantity of gunpowder used, and to the weight of metal, of the carriage, &c. in opposing ratios. This alone would probably give some determination upwards to the shot at the moment of its quitting the piece, and when the air, opposed to the expanding flame, fo forcibly occasions the piece to recoil; but if we call to mind, that that flame being to much lighter than the atmosphere, must instantly be forced upwards thereby, (especially as the concussio upon the foil below would add to such tendencies), we may at once find sufficient cause for the ascent of a shot at the moment it quits the cannon; for both will, with the action of the cannon and the rarefaction of the air at such a distance, whereby a rapid and strong current of aecio is given, tend to cause some departure from a horizontal direction.

The fact lies in a nut-shell; for, unless when following the line of gravity, which is every where locally perpendicular, and of course always points to the centre of that globe we inhabit, nobody can maintain a rectilinear motion; there will always be a tendency to gravitation. This being admitted, it follows, that in order to arrive at a certain level, at a certain distance, an elevation must, either naturally or artificially, be given, whereby the line of flight will be found to describe that unequal curve called a *parabola*, (which fee). Every boy that flings a sling, or throws up a cricket-ball, must be convinced of the truth of our position. The fact may, however, be more certified to the eye, by placing rather behind a cannon (the greater its bore the better) and at about an angle of 25° from the line of fire, when the flight of the shot will be seen to give a curve upwards.

With respect to shells, their lines of flight are exactly on the same principles, but their altitudes being considerably greater in proportion than their baees, the parabolic curve generated assumes a different figure. It should be particularly noticed, that, for the sake of giving effect to the fuses driven into shells, the ordinary periods of flight for particular ranges, i.e. distances horizontally, together with the charges of powder, and the angle of elevation, (usually 45°) are to be carefully noted. If the powder were all of equal strength, the fuses all exactly similar, and equally well driven, or filled, the weight of the atmosphere always the same, and the angle of elevation ever fixed immovable, the lengths of fuses for particular ranges might be always determined; as it is, we fee that considerable variation often takes place even with the same powder, the same gun, the same temperature, and, in fact, with every thing perfectly similar, to all appearance. Observing that the more prosnated the line of flight, the greater the force with which a shell will fall, shall submit the following table of ranges made with sea-service iron mortars, at 45° upon a horizontal plane.

<table>
<thead>
<tr>
<th>13-Inch Mortar</th>
<th>10-Inch Mortar</th>
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<tbody>
<tr>
<td><strong>Charges</strong></td>
<td><strong>Flight</strong></td>
</tr>
<tr>
<td>lbs. oz.</td>
<td>Seconds</td>
</tr>
<tr>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>6</td>
<td>21</td>
</tr>
<tr>
<td>8</td>
<td>24 2/3</td>
</tr>
<tr>
<td>10</td>
<td>26 2/3</td>
</tr>
<tr>
<td>12</td>
<td>29</td>
</tr>
<tr>
<td>14</td>
<td>29 2/3</td>
</tr>
<tr>
<td>16</td>
<td>30</td>
</tr>
<tr>
<td>18</td>
<td>30 2/3</td>
</tr>
<tr>
<td>20</td>
<td>31</td>
</tr>
</tbody>
</table>
The great increase of velocity gained by the heavier charges must be apparent; in the first instance the time of flight is 13 seconds to about 680 yards of horizontal distance, which gives only 50 yards for each second; whereas the latter charges gain on the preceding ones so rapidly, as to give 400 yards in every added second. From this we see, that, unless fired at an improper elevation, mortars cannot be used with their greatest effect, unless so far removed from their object, as to admit of their being charged as high as the metal will bear.

FLINT, in the Mans, is the fiery and obfinate action of an unruly horse.

To fling like a cow is to raise only one leg, and give a blow with it.

To fling or kick with the hind legs, see YERKING.

FLINGING, among Birds. See Bowling.

FLINK, GYPSY, in Geography, a painter of history and portraits. He was born at Cleves in 1616. Early in his youth he exhibited a strong inclination to painting, from which neither the desire of his father that he should pursue a mercantile occupation, the influence of his friends, nor the prospect of making a fortune, could divert him. He was therefore placed under Lambert Jacobs. With him, at the same time, Barker also studied under Jacobs, and the emulation which exalted between these two greatly advanced their progress in the art, but Flink outstripped his companion considerably. He afterwards entered in the school of Rembrandt, and imitated the works of that extraordinary man with great success, and his pictures are now frequently sold as the productions of his master.

He very soon rose into high repute, and was almost constantly employed in painting the portraits of distinguished personages, although his genius inclined him to paint historical subjects, and several of his performances in that style were admired for the goodness of the design and the beauty of their colouring. He died in the year 1660, at the age of 44, very much regretted. After his death his collection of prints and drawings were sold for twelve thousand florins.

FLINT, in Geography, a small borough town in the hundred of Colchill, and capital of the shire to which it gives the appellation. Though almost defirite of trade, it is conveniently situated upon the river Dee; distant from London 204 miles, and 12 W.N.W. of Chelten. This place was formerly fortified, having been surrounded by a double fosse and vallum, and, during the struggle of Cambria for her independence, was celebrated for its strong calfe, begun by king Henry II., but not completed till the time of Edward I. This fortress stands upon an isolated hill in a low marsh, which is occasionally overflowed by the tide. Aniently the efluary of the Dee laved the walls, and a communication was formed between the cale and the advanced works, called the barbacum, by means of a bridge; but the channel of the river is now at some distance. The structure is formed of a reddish grit-ctone from quarries in the vicinity. The form is a right-angled parallelogram, having three of its angles defended by polygonal towers, some remains of which are still standing, including an area within the walls of about an acre. At the south-east is a detached tower of angular construction. It is of a circular form, consisting of two concentric arches, leaving a space between for a gallery eight feet broad; the diameter of the inner circle is twenty feet. In this castle the unfortunate Richard II. took shelter, on his arrival from Ireland; when, quitting it, he was seized by the duke of Lancaster, and carried prisoner to Chelten. During the civil wars it was garrisoned for the king, but surrendered to general Myton in 1646.

FLINT is a corporate town, governed by a mayor, two bailiffs, and other inferior officers; and, in conjunction with Rhuddlan, Overton, Cheeryws, and Caergwrile, sends one member to parliament. The voters are such as pay foot and lot in the respective places, and the returning officer is the mayor of Flint. The church, which is a chapel of ease to Northop, is a mean looking building, having for a steeple a boarded turret. In 1783 a new county gaol was erected upon the plan of one previously built at Ruthin; although the affizes are regularly held at Mold. In the summer featon Flint is frequented as a bathing place, but the marshy nature of the coast, over which the sea at high tides flows, renders the bathing inconvenient, and the air rather insalubrious. Though privileged as a market town, the market has been long discontinued. By the returns made to parliament in 1801, the number of houses was 159, and inhabitants 1169.

A wood in the vicinity of Flint is celebrated, in the annals of history, for having been the scene of many a singular conflict, and as ominous to the English cause. Here Henry II. was twice defeated in one campaign, losing not only his principal officers, among whom were included many of the nobility, but the king himself was frequently in imminent danger of being killed, and narrowly escaped being taken. Penmaen's Tour in North Wales. Skrine's Tour.

FLINT, a considérable river of America, in Georgia, which rises in the country of the Creek Indians, and pursueth first a south, and then a south-west course, joins the Appalachian, at its entrance into Florida. The territory adjoining this river affords a rich soil capable of profitable cultivation, and offering an uninterrupted navigation to the bay of Mexico and Atlantic ocean, and thence to the West India islands, and other parts of the world. On this river is a number of villages belonging to the Creek Indians.—Allo, a small town, about 25 miles long, in the Genesee country, in New York, which runs N.N.E. into Canadarqua creek.—Alloa, a river of Jamaica, which runs into the sea, seven miles W. of Montego bay.

FLINT Island, an island in the gulf of St. Lawrence, near the east coast of the island of Cape Breton. N. lat. 45° 10'. W. long. 59° 40'.


The first, one of the most remarkable of the flinteous flowers, has frequently been confounded with other hard flowers of the same class: the quality it possesses in an eminent degree of giving spurs with the file, and the popular denomination it has thence derived among almost all nations, have been the principal causes of this confusion, which may easily be avoided by a proper attention to its more distinguishing characters. It is, however, to be confessed, that, in some cases, its diagnosis is rendered uncertain by its too great affinity to Horn em and Flint flints (see those articles,) and by its gradual transition into those kindred flowers.

Its colour is chiefly gray, of which yellowish, blueish, and smoke-grey, are the more usual shades, and these pass, the latter into greenish-black, the former into all the well known tints of yellow, reed, and reddish-brown, that approach it, to the carnelian. It is sometimes found perfectly black.
FLINT.

and also displaying several of the just-mentioned colours in strips, zones, and spots.

Flint occurs massive, in angular pieces of various size, in globular boulders, frequently tapering at one end, (the petrified melons of Mount Carmel, vulgarly so called, belong to this variety); also in knobbled, branching, amorphous, perforated pieces, and as hollow balls filled with various substances. (See Grose.) Besides these forms, it sometimes assumes the form of crystals, which however do not belong to it, as some writers have supposed, but are formations from calcareous spar it derives the double three-sided pyramid, as also the five-sided prism terminated by three planes; and it has been likewise observed in crystals formed after the form of lenticular borax or calcite. It is also frequently observed, (contrary to what we know of hornstone) in extraneous external shapes, as petrifactions of species of echinus, madrepora, coralline, &c. Surface little glistering, and of various degrees of smoothness, often coated by, and passing into, a white or yellowish-white crust, of which we shall say more hereafter. Fracture conchoidal, never perfectly pithity; internal surface but little glistering, or dull, of an almost imperceptibly fine grain. Fragments sometimes tabular, very sharp-edged, and more or less translucent in proportion to the lighter or deeper colours of the stone. It is easily frangible. Its hardness appears to be in a ratio with the depth of its colours: in general it will scratch quartz.

Specific gravity, according to Gellert, 2.581; Blumenbach 2.594; Gmelin 2.999. To these physical characters of flint we may add the one afforded by its phosphorescence, and the peculiar smell, which are manifested when two pieces are rubbed together.

Flint is infusible before the blow-pipe without addition, but loses its colour and becomes opaque. By the intense heat excited by a stream of oxygen gas, Mr. Lharmann found it to melt into a white glistering quartz-like globule.

Its constituent parts are,

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<tr>
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<tbody>
<tr>
<td>Silica</td>
<td>98.00</td>
<td>97.00</td>
<td>87.00</td>
</tr>
<tr>
<td>Lime</td>
<td>0.50</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Alumine</td>
<td>0.25</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>Oxyd of iron</td>
<td>0.25</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Lofs</td>
<td>1.00</td>
<td>0</td>
<td>100</td>
</tr>
</tbody>
</table>

|      | 100.00    | 100.00    | 100.00   |

Flint is met with in most parts of Europe, particularly in the north of France, in England, Saxony, Tyrol, Poldavia, &c. Norway seems to be deflitate of flint, as it is of chalk; also in Sweden it is scarce. In Denmark it is principally at Vordeborg and Taxo, in the island of Seeland, that some chalk-hills with imbedded flints are found; and more copiously in the remarkable Stevens-Klint. It occurs but seldom in primitive mountains, and when found there, only in veins, as, for instance, in the Saxony Erzgebirge. Its principal geographical situation is in the Switz-mountain, where it occurs chiefly in common compact lime-flint or in chalk; in the sand-flint formation, where it is also met with in the flake of those conglomerates vulgarly called Puddingstone. See this article.

Though the formation of flints is a subject which has engaged the attention of many naturalists, yet but few opinions have been broached respecting it that will at all stand the test of closer investigation. The theory which explains their origin by a metamorphosis of one earth into another, though it may appear absurd to the chemist who is unable to produce the same changes in his laboratory, has notwithstanding its able and celebrated defenders. Some have endeavoured to prove that the argillaceous, others, that the calcareous earth, underwent this conversion into flint. Buffon was an advocate for the argillaceous origin of this stone; and the observations of Pallas appeared to corroborate the opinion of the French naturalist; for he found that the Ephemera borax, which abounds in the Molus, had in some places perforated the clayey bottom of this river with innumerable tubes closely joined; and in the adjacent fields pieces of perfect flint frequently occurred that were placed precisely in the same manner as the clay, from which they were not found to differ in any respect but in fracture and hardness. In the same manner he states that, in the small river Sungbir, near Woldenmire, black, globular, rolled masses occur, which, on being broken, exhibit, from their circumference to the central part, a gradual transition from red clay and clay-stone into what he considers as perfect flint. With all deference, however, to the great merits of this excellent observer, we cannot but fee in his account one of those frequent cases in which the hard flints of the siliceous clays (and clay flint and Jasper belong to it) have been mistaken for real flint merely by reason of their giving copious sparks with steel; for this appears to be the character on which Pallas has chiefly founded his diagnosis of the stone he describes.

According to other geologists, it is lime-flint, and principally chalk, which have undergone a transformation into flint—an opinion which Wallerius endeavoured to support both by geographical and chemical facts, and which was followed by Linnaeus himself. Also Gillet-Lamont and Girod-Chantres, from observations they respectively made in various parts of France, were induced to consider flint as a mere modification of chalk. The principal ground on which this hypothesis appears to rest is the geographical relationship that subsists between the strata of chalk and of flints, together with the intimate union of the boulders of flint and their white earthy crust; both these substances being to completely incorporated with one another, as to preclude the possibility of there being in the lime which each may be considered as perfectly distinct from the other. This latter reason, though specious, may, however, lose much of its force by future analysis of that white earthy substance. To us it appears that most of the boulders of flint, such as they are found embedded in chalk, are but seldom familiar with a coating throughout calcareous: it seems to be comprised of a twofold crust, viz. an outer chalky one, originating from the matrix of the stone; and an inner one passing over into the outer, and, by reason of the thinness of colour, not distinguishable by the eye. This inner crust matures no effervescence with acids; it appears to be fleshy, and may perhaps be properly looked upon as the result of incipient decomposition; especially if it be considered that flints with uncoated surface, by a long exposure to the influence of moisture and other atmospheric agents, have been known to acquire another thin coating (but not calcareous,) with lols of weight.

Many geologists of the present day, who consider the idea of a transmutation of the calcareous into siliceous earth as unworthy the advanced state of modern chemistry, at the same time that they are unwilling to have recourse to floods and other revolutionary agents for rolling fragments of flint into boulders, and dispersing them in the regular manner in which they are now found, have adopted, from the hypotheses of infiltration by means of a siliceous fluid; others, that of a forcible injection of melted flint into cavities previously existing in the calcareous strata. But either of these
FLINT.

theories is open to objection; and, indeed, the same objections appear to apply to both. It is difficult to account for the strange predilection the flinty fluid (whether its fluidity proceeded from water or fire) has manifested for flint lime-bone, particularly for chalk; while other flint and primitive rocks, several of which must be supposed to have been equally exposed to it, remained perfectly untouched. Nor is it much easier to conceive how that suppoed fluid can have found its way into so many approxi-mate, but perfectly distinct, hollows in the chalk, without more or less penetrating the intermediate parts, or leaving traces of mafles that were connected with the nodules as they now appear; not to mention the improbability that so many both contiguous vacuities (especially those that must be suppose to have been the moulds for the frequently occurring tabular expansions of flint) should not have yielded to the pressure of the superincumbent stratum. As, moreover, these hypotheses are silent respecting the origin of this flinty maf, (although a substance is different in its appearance from common flint,) another theory of the generation of the nodules of flint has been proposed, which, however, is not likely to meet with any followers among those geologists, whose exalted ideas of the present state of chemical knowledge lead them to suppose that the refult of their analytical and synthetical processes must of necessity, in all cases, square with those great operations that, with her ample means, and affihed by a long series of ages, have been accomplished by Nature in the vast laboratory of the earth. We allude to the hypothesis, according to which all flint, whether it be found in nodules or as flat tabular plates, originates from the bed of a stratum of marine gelatinous animals, which perished by some revolution, and were buried in their shells. The internal aspect of the nodules, and their being almost constantly found imbedded in flint lime-bone, which, by molt geologists, is allowed to owe its existence to shells and other calcaneous coverings of tender animals, seems fball to have suggested this new idea; which, if range as it appears, may be allowed to have as much plausibility as any of the former; especia11y as it may be adapted equally well to the sytem of an igneous, and to that of an aquatic origin of terrestrial bodies. Mr. Patrin is of opinion, that when the chalk was deposited at the bottom of the sea, in those strata which we now see, it met, on other strata already existing, a vast number of marine bodies, shells, madreporas, &c. while others were carried along with the precipitating chalk itself, such as medusas, &c. whose soft and gelatinous bodies, while they occupy much space, contain but little subiubility. When all these marine animals were buried in the chalk, and their decomposition took place, those of a confidence merely gelatinous, left in their matrix an empty space, nearly equal to the space they occupied when alive: their subiubility, alone in a state of fluidity, was absorbed by the porous foids of the cavity; and by the combination of this animal fluid with the chalk, these foids were, by some unknown agent, converted into flint. In this manner Mr. Patrin accounts for the generation of nodules that are either hollow or filled up with chalk; which latter may have been depofed there by means of some aperture, or may have penetrated through the flint entifel, when full in a state of fottifes. As to thole nodules, the central part of which is of a more perfectly flinty nature than that nearer the circumference, they were, according to the fame author, formed of marine animals of more confidence or solidil; and it is in these particularly that velites of animal organization are found. The more confident part of the body of these animals produced the more perfect flint, such as we see it in fuch solid nodules; while the fluid which escaped from the body, by the effects of decomposition, formed the external layers of the nucleus, which, being mixed with the substance of the chalk, became fels perfect flint, the further it removed from the central part. According to this explanation, the fult imperfect part of a nodule of flint would be that, which, in its original situation, occupied the lowest place, and towards which the fluid which escaped from the more solid nucleus must naturally have taken its direction. This, however, is never found to be the case; nor has Mr. Patrin endeavoured to account for this circumstance. What appears to be much in favour of this explanation is, that the whole body of echinii in their fells has been found converted into flint; and Gillet-Laumont has frequently observed that those echinii, which he met with in the chalk strata of Monfreul-fur-Mer, were furnished with a flinty appendage filling from their mouths, and which appears to have been the animal subiubility converted into a flint slate by decomposition. The fame circumstance is not feldom observed in bivalve fells, whose gelatinous inhabitants have been found in a perfectly fuble clarity; while the fells themselves had retained their original calcaneous nature, and were partly converted into flint. In cases where the gelatinous marine bodies were in such abundance that no intermediate space was left for the deposition of chalk, the flint has been formed into large mafles and plate of considerable extent. Dr. Darwin's ideas on this subject are nearly the fame, and modified only by his adopting a different theory for explaining the conversion of the gelatinous animals into flint. He conjectures that the nodules of flint found in chalk-beds have gained their form, as well as their dark colour, from the fells of the shell-fish from which they had their origin, but which have been so completely fuble by heat, or heat and water, as to obliterate all velites of the shell; in the fame manner as (according to the doctor's opinion) the nodules of agate and onyx were produced from parts of vegetables, but which had been so completely fuble as to obliterate all marks of their organization.

A remarkable circumstance, relating to the geological history of flint, should not be passed over unnoticed in this place: it is that Sir Henry Englefield has observed in the neighbourhood of Carli brook, and in other parts of the Isle of Wight, an immense number of nodules of flint, all of which, though not removed out of their places, and retaining perfectly their original shape, were more or less tufted or flattered. Some few were only split into large pieces, but the greater part were broken into small fragments, and some absolutely reduced to impalpable powder. The chalk strata in which they were imbedded had an inclination of at least 67 degrees, and perpendicular lines traversed the whole. Sir Harry conjectures, "that when the tremendous convulsion took place which sunk them to the situation in which they now appear, (at which time the channel which separates the Isle of Wight from the main land was perhaps formed,) the flata of chalk, in the act of subfidence, had a tendency to slide on each other; and this would have exerted most fublefully where, from the inclination of the strata, the cohesion of the parts of the chalk was the weakest. This motion, or rather flipt of so enormous a weight, might in an instant shatter the flints, though their edges fheep the incipient motion; for the flints, though crude to powder, are not displaced, which must have been the case had the bed flipt horizontally." This theory appears to us very unsatisfactory, though we are not prepared to give a better. The advocates for the 1st mode of flint decay,
FLINT.

perhaps, be inclined to account for the phenomenon by an accidental sudden cooling of the flinty masses.

We conclude this article by adding a few words on the use to which flint is applied, some of which are of considerable importance. The one derived from its giving copious sparks with fleck is the most ancient and generally known; but the art of cutting or rather breaking this flint into regularly shaped gun-flints is of more modern date, and was not practised till a considerable time after the invention of fire-arms. The mode of making gun-flints has for a long time been involved in fable and mystery: the most absurd and contradictory accounts having been given of it by various authors; and it was not till lately that we have been made fully acquainted (by Hacquet of Vienna, and by Dolomieu) with the simple manner in which the flints are manufactured in Galicia and in France, where they constitute an important article of trade. (See Gun-Flint.) The art of squaring and chipping flint was practiced long before that of making gun-flints; and as this latter requires exactly the fame management and the same tools, the former cannot properly be called a loft art, though, on account of the expensiveness of such square pieces of flint, if employed for constructing walls and covering roofs, it is not much practiced. The north wall of the Bridewell at Norwich, mentioned in a letter of Mr. Baker, in the 43d volume of the Philosophical Transactions, was built of flints, "squared to such a nicety, that the thin edge of a knife could not be interposed between the joints without a great deal of difficulty." And we learn from a note to that letter, that the gate of the Austin friars at Canterbury, the gate of St. John's abbey at Colchester, and the gate near Whitehall, Welfinnder, are executed in the same talle; and the platform on the top of the Royal observatory at Paris, which is paved with flint after the same manner, is adduced as a proof that the French have in some measure recovered the art. Flint is also often employed in the manufacturing of glafs, small, porcelain; and some of its lighter colored and striped varieties are made use of for ornamental purposes. They take an excellent polish, and are not unfrequently manufactured into snuff-boxes, &c.

FLINT. The history of this fossil presents a labyrinth of blunders and confusion. On one hand it has been described under the names of well defined Wernerian species of rocks, such as horn-flone, trapp, &c.; on the other hand it has been jumbled together with various mineral substances, under the vague and mislytematic appellations of roche cornéene, petrofilex, and particularly (by German mineralogists) under that of "hornschiefer," or creosmal flate. This latter was applied by some mineralogists to the subject of this article; but by others it was indiscriminately given to hornblende-flate, to varieties of clay-flate, to mice, and to porphyry-flate; whence professor Werner, to prevent the fame confusion that has been introduced into mineralogy, by the term "flate," expunged that of hornschiefer, (though he had made use of it himself,) applying to the fossil in question the name of kieselschiefer, now generally adopted in Germany, and of which "flint-flate" is a literal translation. The just mentioned author has divided this species into two sub-species, viz. into common flint-flate, and Lydian flone. The latter has been confidered by some as a mere variety of the former; but there are good reasons for keeping it different. See LYDIAN STONE.

Common flint-flate occurs generally of a dark grey colour, which has frequently an admixture of blue, of red, and of yellow; and these tints often pass over into each other, or are seen separately in the same fragments, as spots or stripes. The blood-red and brownish-red varieties are the fairest. It is found massive and in rounded pieces, which latter have a smooth surface. Internally it is dull; now and then rather glimmering. In small fragments its fracture varies; it is sometimes splintery, and imperfectly conchoidal, and sometimes paffes into even; the blackish-grey variety with the latter fracture approaches the Lydian flone. In large masses it manifests its flaty nature. Its fragments are angular and sharp, and but little transparent at the edges. It is brittle, and its hardness nearly the same as that of quartz. Another pretty comitant character of flint-flate is its being traversed by veins of quartz, that are often of a greyish or reddish colour. Specific gravity, according to Gerhard, 2.869; according to Kirwan from 2.596 to 2.631. Those varieties of flint-flate that have been chemically examined are not fusible per se; nor do they much change their colour in the fire; the grey becomes rather lighter colored, the black does not appear to be at all affected by the heat of the blow-pipe. Wieglew's analysis of flint-flate from Fulda (in vol. i. of Chem. Annalen, where, however, it is called hornschiefer, and considered as of volcanic origin) has given the following result:

<table>
<thead>
<tr>
<th>Substance</th>
<th>Specific Gravity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica</td>
<td>1.59</td>
</tr>
<tr>
<td>Lime</td>
<td>1.00</td>
</tr>
<tr>
<td>Magnesia</td>
<td>2.55</td>
</tr>
<tr>
<td>Oxid of iron</td>
<td>2.95</td>
</tr>
<tr>
<td>Inflamm. particles</td>
<td>4.02</td>
</tr>
</tbody>
</table>

Flint-flate appears to pass over into Lydian flone, into horn-flone, quartz, and particularly into clay-flate; so that when seen in small fragments, it is often difficult to seize its distinguishing characters. It is found in various parts of Germany, Bohemia, Silecia, in Bareuth, the kingdom of Saxony, the Hartz, Palatinate, Salzburg, &c.; and, according to Mr. Jameson, in various parts of the great tract of transition rocks in the south of Scotland. The geo- nomic relations of flint-flate are not well ascertained, and indeed it is difficult to assign it a proper place among the rocks. It is generally found in huge, cliffy, and clagggy masses, particularly on granite and clay-flate, and more frequently as beds in transition, clay-flate, grauwacke, and grauwacke-flate. From the observations of some geologists it would appear that flint flate is, in many cases, to be referred to the transition rocks of Werner; and, according to Freidleben, the specimen in Laffin's collection of rocks, which by this author are described as varieties of trapp, belong to the transition flint-flate; whence its occurring as angular fragments in grey-wacke, and as rounded pieces in the old red sand-flone can be no matter of surprise. Most frequently, however, it occurs in the shape of boulders, on plains, and in the beds of rivers.

FLINT is used, in our military service, for the purpose of affixing into a vice made at the top of the cock of a musket, or piflot lock; so that when impelled against a piece of steel, called the hammer, it may strike fire, and ignite the gun-powder contained in a pan, concealed by the hammer, until the latter is forced backwards on a pivot, by the great force with which the cock strikes against it; when it not only produces fire, but, by its peculiar form, directs the sparks towards the priming in the pan.

Flints are easily adapted to this purpose; those great masses which are found chiefly in chalky soils, being broken by hammers, yield a number of wedge-like pieces.
FLINT.

of which the sides are trimmed to the proper width, and the backs brought into a proper form, which should be rather concave. This concavity is, however, very little attended to, but is of great service, since it escapes the screw of the vice, and causes the flint to retain a much firmer hold than when its back is made either straight, or convex; the latter is a great fault, but is commonly overlooked.

The proper sizes for flints are as follows; for a musket, one inch and five-eighths, for the length, with a width of an inch and a quarter; the thickness is the back one-third of an inch, and the tapering to be rather fudden than gradual, something like the end of a knife. Such flints fit well in the vice, being previously laid in a bed of thin flint-lead, or for want of it, in flint leather. The edge of a flint, thus formed, is far less subject to splinter, than when the angle is more acute. It may perhaps be objected, that a thin edge strikes fire better than a thick one; but that will be for only a few rounds; whereas the thicker edge refines better, and prefers an equable facility of fortis.

All military men must know that nothing is more adverse to the operations of a regiment, than the necessity (which too often occurs in consequence of the proper form not being sufficiently attended to) for men to quit their ranks for the purpose of either hammering, or changing their flints. To the brave man such a necessity is painful, as well as dangerous, while to the less resolute it serves at least for a pretext to pass the rear, or eventually to relinquish his post altogether.

A carbine flint should be one inch and a quarter in length, by one inch in width; that for a pistol, such as is used among our military, ought to be rather more than an inch in length, by three quarters in width. In fixing them into the vice, great care should be taken that their left sides pass down clear of the barrel, which they would otherwise have very much, and be themselves subject to splinter, while the cock itself might, by being unduly checked, be snapt at its neck.

When flints have a curve, they should always be so fixed in the vice, as to give the curve a downward direction; since, in that way, they act more forcibly, and offer the greatest resistance. Straight flints, after being so far rounded as to yield no sparks, when their chambered flints have been uppermost, may be again rendered serviceable by being reversed, so as to bring their flat sides uppermost. Soaking flints in water refines them partially, probably by exposing them with hydrogen, but in a very small degree, and that not permanently.

The best flints are such as, when acted upon by fire, produce strong lasting corruptions, which emit a fulphenous smell, and are sufficiently large to leave some little flint on tinfoil paper, or on fine linen. Such will not only be found to yield a certain fire, but to break up admirably under the hammer employed to reduce them to splinters, and to fit them for the folder's use. On the contrary, however, clear, black, and firm a flint may appear, if its flarks are not vivid, and highly fulphenous, it ought to be at once thrown aside.

The hardest flints being generally the best, experiments were made with agates, cornelions, &c. all of which produce beautiful flarks, but, being extremely brittle, could not be brought into general use; however, in situations where they are obtainable, and where flints are not to be had, they become valuable sublimates. Various attempts have been made to produce flints by means of composition; but such have always proved vitreous, and consequently weak both in substance, and in the production of flarks. We cannot conclude this article without strongly recommending, that more attention be paid at our arsenals to the rejection of flints of defective form and quality.

Flints are generally packed in small casks, called half-barrels, each of which contains Number qr.s. lbs.

Musquet flints 2000 weighing 2 14.
Carabine do. 3000 2 10.
Pistol do. 4000 15.

The tonnage of this article is computed at 28 lbs. of musquet-flints to occupy 18 cwt. and 10 lbs. of pistol-flints to occupy 3 cwt. 2 qr.s. which our readers cannot fail to observe by no means corresponds with the foregoing table of contents.

Flints, in the Glafs-trade. The way of preparing flints for the nicest operations in the glas-trade is this. Choose the hardest flints, such as are black and will refit the file, and will grow white when calcined in the fire. Cleanse the edge of the white crust that adheres to them, then calcine them in a strong fire, and throw them, while red-hot, into cold-water; wash off the ashes that may adhere to them, and powder them in an iron mortar, and sift them through a very fine sieve; pour upon this powder some week aqua fortis, or the phlegm of aqua fortis, to dissolve and take up any particles of iron it may have got from the mortar; sift this mixture several times, then let it rest, and in the morning pour off the liquor, and wash the powder several times with hot-water, and afterwards dry it for use. You will thus have a powder for making the purest glass, as perfectly fine and faultless, as if you had used rock crystal itself. Cramer's Art of Allying Metals, p. 438.

The washing off the ferruginous particles with aqua fortis is not necessary when the glass intended to be made is to be tinged with iron afterwards; but when meant to be a pure white, this is the method that will secure success.

Flints, the small, sharp, hard, vitrifiable stones which often abound in foils of the more thin, poor kinds.

Flints, oil or liquor of; a name given by some to a preparation made of four ounces of flints, calcined and powdered, and mixed with twelve ounces of salt of tartar; these being melted together in a large crucible, by a strong fire, run into a glass, which quickly and strongly attracts moisture from the air, and is entirely soluble in water, except a very small portion of earthy matter; this glass, being afterwards powdered and set in a can, runs into an oil per deliquium, with this and the calc of any metal is prepared one of the metallic Vegetations. If any acid be added to the liquor of flints, so as to saturate the alkali, the flint, which was kept dissolved in water by means of this alkali, will be now precipitated in the state of a fine earth, which earth is entirely soluble by acids.

FLINT WAlls. See Wall.

FLINT NODULES, in Geology, are a phenomenon of a curious and important kind, when their regular disposition through the chalk strata are taken into consideration, as well as the angular and somewhat regular shapes which they assume. The great assemblage of chalk strata which form the uppermost but two of the assemblages of strata in Britain, as far as is yet known, (viz. the London-clay and Bagshot-fand,) abound with these nodules in about the upper half thereof, called the upper or flinty chalk, while the under part, called the lower or hard chalk, has few if any flints occurring in it, and these, at its upper part, if such do occur. It is well ascertained, that none of the chalk flints are entirely free of minute grains of siliceous or gritty matter in them, whence the use of chalk or whiting in founding tin, copper, and other wéths arises; and modern observations by Mr. Smith and his pupils have thrown, that these layers of flints...
FLINTS. This county extends in length 33 miles, and in breadth from 8 to 9, containing about 165,000 acres of land, of which, according to the report to the Board of Agriculture, only 20,000 are in an arable state 116,000 under palt urge, and the remainder in a state of waste. The principal rivers are the Dee, which rising in Merionethshire, after running through Denbighshire, falls into this county, and is navigable from Chester to the sea. The Clwyd also has its source in Denbighshire, and, running in a northerly direction, is joined by the Alan below St. Asaph, and falls into the Irish sea. It is also watered by the Sevon, the Wheel er, and a few minor streams. The face of the country is much less diversified than any other Welsh county. A ridge of low hills rises abruptly on the north-eastern part of the county from the Dee, and, running parallel with that river, terminates at the sea. The vale of Mold is a rich level country, and, on the vale, rather valley of Clwyd, has been long celebrated for its picturesque beauty. The northern part is champagne, and abundance with corn; the valleys consist of an argilaceous soil, and are productive in graz. The cattle are small, but considered excellent milchers. Quantities of honey are annually produced, which the inhabitants manufacture into a kind of wine called Methelin. The hills are barren, but are internally rich, containing free-stone, lime-stone, coal, lead, copper, and calamine, the ores of which are worked, and the metals exported via the port of Chester. The county politically is divided into five hundreds, viz. Colegill, Mayler, Mold, Prestlaw, and Rhuddlan, comprising one city, St. Asaph, one borough, Flint, and four other market towns, viz. Caerwy, Caerwyl, Mold, and Holywell; and twenty-eight parishes, 23 of which are in the diocese of St. Asaph, and five in that of Chester. By the returns made under the population act to parliament, in 1801, the number of houses was 37,582, and inhabitants 39,623; in which number it appeared 10,332 were occupied in the labours of agriculture, and 6,89 in employed in trade. Many of the latter find employment in the mines and smelting-bores, and others in the linen trade, a manufacture of which was, by the patriotic exertions of Mr. Fitzwilliams, introduced into the country, and has since spread, and is at present in a flourishing state. The county is represented by one member in the British senate.

FLINTY GRAVELS are such gravelly soils as contain a large proportion of flints in their compositions. They are met with in many situations.

FLINTY SOILS, all such as are constituted with a large proportion of flinty matters. These soils are mostly thin, and of no very great fertility. They prevail in many situations. See Soil.

FLUP, a sort of sailor's drink, made of malt liquor, brandy, and sugar, mixed.

FLUSHNGUE, in Geography, a small island or fortres in the East Indian sea, a little to the west of Amboyna.

FLUTTER-Mouse, in Zoology, the bat. See Vespertilio.

FLUX, in Geography, a small town of Spain, in Catalonia, formerly defended by a castle on an eminence, but now dismantled, penetrated by the Ebro; 8 leagues above Tortosa, near the cataract of that river.

FLUX WOOD, in Botany, a species of water-cresses, which grows in uncultivated places, and by the side of foot ways in many parts of England; it flowers in June, and the seeds, which ripen in August, are greatly recommended by some for the gravel and retention of urine.

FLIZE, in Geography, a town of France, in the department of the Ardennes, and chief place of a canton in the diocess,
FLOAT, or FLEET. See FLOAT, and FLEET.

FLOAT of a fishing-boat, &c. See FISHING-BOAT.

FLOAT, sometimes called catamaran, also denotes a certain quantity of pieces of timber, joined together with rafters athwart, thrown into a river to be conveyed down the stream; and even sometimes to carry burthen's down a river with the stream. The invention of floats is of great use; it is said to have been first put in execution at Paris in the year 1618. (See BOAT.) The term also signifies to turn water upon meadow-land, with the view of dressing and improving it. And it likewise implies the piring off the surface, turf, or level of grassy lands. See RAFT.

FLOAT, in Engineering, signifies a low or shallow boat, often called a dirt-boat, used in the repairs of canals; which see. See FLATTS.

FLOAT-BORDS, those boards fixed to water wheels of underfoot mills, serving to receive the impulsion of the stream, whereby the wheel is carried round. See WATER-WHEEL.

It is a disadvantage to have too great a number of float-bords; because, when they are all struck by the water in the best manner, the force of the water upon each of them, the sum of all these impulses will only be equal to the impulise made against one float board at right angles, by all the water coming out of the penstock, through the opening, so as to take place on the float-board. The best rule in this caue is, to have just so many, that each of them may come out of the water as soon as possible, after it has received and acted with its full impulsion; or, which comes to the same thing, when the succeeding one is in a perpendicular direction to the surface of the water. As to the length of these float-bords, it may be regulated according to the breadth of the stream. See Defaguerius, vol. ii. p. 425.

FLOAT-GRAVE. See FLOATS.

FLOAT-ORE, in Mining, or lead-ore, signifies in some places, the same with dream-ore, or that found alluvial in the bottoms of valleys, as tin often is in the valleys in Cornwall.

FLOAT-BOAT. See QUARTZ.

FLOATAGES. See FLOATS.

FLOATING Bodies. On the Stability and Equilibrium of Floating Bodies.—Although the general principles relating to this subject will be considered in their proper order under the articles FLUIDS and SPECIFIC GRAVITY, yet there are a few interesting theorems more particularly belonging to floating bodies, and which, forming a subject of themselves, seem to merit attention in this place.

Taking for granted the elementary principles of hydrostatics, as previously established, we shall examine the cases in which floating bodies are in equilibrium, when that equilibrium is stable, and when tottering or unstable. In every system of bodies, whether floating in fluids or acted on by the force of gravity, there are two states of equilibrium, entirely distinct. In one, if the equilibrium be ever so little deranged, the bodies which compose the system only oscillate about their primitive position, and the equilibrium is said to be firm or stable. This stability is absolute if it takes place, whatever be the nature of the oscillation; it is relative if it only takes place in oscillations of a certain kind; in the other state of equilibrium, if the system be ever so little deranged, all bodies deviate more and more, and the system, instead of having any tendency to recover itself in its primitive position, is overtaken, and assumes a new position, entirely different from the former.

We may form a just conception of these two states, by supposing an ellipse placed vertically on an horizontal plane; if the ellipse is in equilibrium on its smaller axis, it is evident that, upon a slight derangement, it will tend to regain its original position, after several small oscillations, which will soon be terminated by the friction and resistance of the air; but if the ellipse be placed in equilibrium on its greater axis, if once it deviates from this position, it will continue to deviate more and more, till it finally turns itself on its lesser axis. In the above example there is this remarkable circumstance; the four positions of equilibrium of the ellipse on the extremities of its two axes are alternately stable and unstable, and this takes place in every case. For suppose two positions of stable equilibrium to take place in any body, and such that there does not exist between them any position of the same kind, if the body is placed in one of these positions, and is made to deviate from it, and to approach the other, according as this deviation is greater or less, the body will either return to its original state, or will arrive at the other position. There will evidently, therefore, be some intermediate position in which the body will neither tend towards one or the other of the former, but will remain at rest: but this state of equilibrium will be unstable, since, if the body be made to deviate from this position so little towards one of the other positions, it will necessarily arrive at it. Hence it appears, that if a body turning round a fixed axis passes through several positions of equilibrium, they will be alternately stable and unstable.

The flablility of a floating body is the greater as its centre of gravity is lower than that of the displaced fluid, or as the distance between these centres is increased; it is for this reason that ballast is put in the lower part of vessels to prevent them from being overrilt.

The nature of the equilibrium, as to stability, depends on the position of a certain point, called the meta-centre, or centre of pressure. The term was first adopted, we believe, by Bouger, in his Traite du Navire.

When the meta-centre is above the centre of gravity, the equilibrium is stable; on the contrary, when the meta-centre is lower than the centre of gravity, the equilibrium is tottering; when the meta-centre coincides with the centre of gravity, the body will remain at rest on it, if it is placed without any tendency to oscillation.

The determination of the meta-centre, and of the nature of the small oscillations of a floating body about its primitive position, is a problem of considerable importance.

Laplace gives the following rule for determining whether the force whichsubjects the fluid to restore it to the same state again, when deranged from its primitive position.

"If, through the centre of gravity of the section of the surface of the water on which a body floats, we draw a horizontal axis to pass, such that the sum of the products of every element of the section, multiplied by the square of its distance from this axis, be less than relatively to any other horizontal axis drawn through the same centre, the equilibrium will be stable in every direction, when this sum forms the product of the volume of the displaced fluid, by the height of the centre of gravity of the body above the centre of gravity of this volume."
it is also necessary that its centre of gravity be in the same vertical line with the centre of gravity of the displaced fluid, otherwise the weight of the solid will not be completely counteracted by the pressure of the displaced fluid.

When the lower surface of a floating body is spherical or cylindrical, the meta-centre must coincide with the centre of the figure, since the height of this point, as well as the form of the portion of the fluid displaced, must remain invariable in all circumstances. The place of the meta-centre is determined by the doctrine of Forces combined with the elementary principles of hydrostatics, by considering the form and extent of the surface of the displaced portion of the fluid compared with its bulk and with the situation of its centre of gravity. According to Dr. Young, if a rectangular beam be floating on its flat surface, the height of the meta-centre above the centre of gravity will be to the breadth of the beam as the breadth to twelve times the depth of the part immersed. Hence, if the beam be square, it will float squarely when either the part immersed, or the part above the surface is less than \( \frac{1}{2} \) of the whole, but when it is less unequally divided by the surface of the fluid it will overfall. If however, the breadth be so increased as to be nearly one-fourth greater than the depth, it will possess a certain degree of stability, whatever its depth may be. Plate VIII. Hydraulics, fig. 1, taken from Dr. Young, is intended to illustrate this.

Two square beams floating at the depths shown at A and B, will have a certain degree of stability, but if they sink, as at C, they will overfall; but a beam of the breadth shown at D will always float squarely.

Theory of the Stability and oscillations of floating Bodies.—When a floating body is in equilibrium, if it be deranged from this state by any cause whatever, it is the object of this investigation to determine the circumstances in which it will return to this state, or continue to deviate more and more from it.

In the state of equilibrium (fig. 2), the straight line GO, which joins the centre of gravity G, of the body DEF, to the centre of gravity O, of the displaced fluid AFB, is vertical. Let this line be taken as the axis of \( \pi \); (see Forces, where this method of analysis is explained). If the body be deranged, this line GO becomes inclined, and O is no longer the centre of gravity of the displaced fluid \( AFb \); the derangement is here supposed infinitely small; the plane of \( x \) and \( y \) is taken as horizontal, and passing through G, the axis is projected as a point in G. \( G \times \) is the axis of \( x \). A B represents the floating surface in a state of equilibrium, \( a B \) in its new position; the co-ordinates \( y \) are supposed parallel to the axes of these surfaces, which separate the immersed part of the body from that which is above the fluid; this axis may be called the axis of the floating surface; it is projected on the point C. The point O may be placed lower than G, without changing any of these considerations. The figure supposes a body not homogeneous, but having the inferior part artificially rendered specifically heavier than the fluid, as in the case of ships. The angle \( aCA = \beta = GOV \) is supposed infinitely small; so that we may imagine the elementary solid \( ACa \) as formed by the revolution of the surface AC, round the axis C of the floating surface. The same may be said of \( BCB \); \( \varphi \varphi \), and \( pp \), are the projections of the arcs described by the centres of gravity of BCC, A from the vertical motion of the body, we may consider \( ABb \) as equal to \( AFb \); so that the portion \( ACa \) out of the fluid is equal to the part \( BCB \), which is immersed in it. If it were otherwise the weight of the body would no longer be equal to the pressure of the fluid; and these two forces acting on \( C \) would produce a vertical motion in the body; besides which it would turn round C as a fixed centre; and as this last motion is independent of the first, and the only one which we are to investigate, this hypothesis simplifies the question by confining it to the latter motion only. The expressions, therefore, for the volumes \( ACC, BCB \), are to be made equal, that is, \( AC \times p'p' = CB \times q'q' \); and since the momenta of the areas \( ACC \) and \( BCB \) are equal with respect to the axis \( C \), the centre of gravity of the surface \( AFB \), or \( aB \), is situated on this axis. The equilibrium being disturbed, we are to consider the motion which the body will take. Let \( GO = a \), the volume \( AFB = afB = S \); also \( \sin \beta = b \), \( \cos \beta = 1 \).

The pressure of the fluid on the merged portion \( aB \) is equal to the weight of the displaced fluid; this force acts on the centre of gravity of \( aB \), and since it is the position of this centre which is to determine the motion of the body about the point \( G \), its position must be determined by taking the moments relatively to the planes \( \pi \), \( \varphi \).

\[ \varphi \times (ABG + BCB) \]

is the momentum of \( aB \), supposing \( CG \) in \( \alpha \).

\[ BCb \times q' \]

will be that of \( CBb \), because \( q' \) differs but an infinitely small quantity from the extremity of the vertical passing through the centre of gravity of \( BCB \).

Likewise, \( aCA \times \varphi \) will be that of \( aCA \).

Let \( g \) be the projection of the vertical passing through the centre of gravity of \( aB \), then \( aB \times CG = S \alpha \) will be the momentum of \( aB \), supposing \( G \alpha = x \). The momentum of \( aCA \) should be taken with a contrary sign from that of \( aB \), since the weight and the pressure tend to make them revolve in contrary directions round the axis \( y \).

Hence

\[ Sx = ACa \times \varphi = S \alpha \beta + CBb \times q' \]

and \( Sx = S \alpha \beta + CBb \times \varphi q \).

To determine the centres of gravity of the elementary portions \( A C a, BCB \), we must divide the sum of the momenta of their portions by their volumes; let any element, \( \gamma \), be taken of the surface \( ACa \), whose distance from the axis of the floating body \( C \) is \( \beta \); then \( \beta \) is the arc of rotation of \( ACa \) round this axis, or the height of the little elementary parallelepiped which it describes; \( \beta \) will equal its sum, \( \gamma \beta \) its momentum relatively to a vertical plane passing through \( C \); \( \beta \gamma \) is the sum of the momentum of the fluid in the nature of inertia of the area \( AB \) relative to its axis, which momentum is positive and known, since this axis is parallel to that of \( \varphi \), and passing through the centre of gravity of \( AB \); hence, the abscissa \( G \alpha = \) of the pressure of the fluid is

\[ x = \left( a + \varphi \beta \right) \beta \]

The momentum of the volume \( AFB \) is positive, only because the centre of gravity \( O \) of the displaced fluid is more elevated than that of the body. If, on the contrary, the point \( O \) had been lowered, the perpendicular \( GV \) would have fallen on the opposite side, then the momentum of \( AFB \)
A F B would have tended to turn in a contrary direction, and we should have had

\[ x = \left( -a + \frac{b^t}{S} \right) \theta. \]

The general formula is therefore \( x = \left( \frac{b^t}{S} + a \right) \theta \); the sign + for the case of the centre of gravity of the body being lower than that of the fluid, the sign - for the contrary.

The co-ordinate \( x \) being thus determined, it now remains to determine \( y \).

We have already \( A F B + A C A = A F B + C B b \), and the moments relatively to the plane of \( xz \), that of \( A F B \) is \( S_y \), that of \( A C A \) is \( S_x \), since the centre of gravity \( O \) is in the plane \( xz \); we have therefore only to eliminate \( b \) of the two elementary sections.

Let us suppose that the ordinates of their respective centres of gravity in the direction of the axes of \( x \) are positive, the element \( t \) taking upon \( C B \) gives the elementary parallelohedron \( S_z t \), denoting its distance from the plane \( xz \); \( b t \) denotes its momentum; the sum of these moments is therefore \( \int f(t; r) \), observing that their signs must vary with the sign of \( r \), that is, as these elements are situated on one or the other part of the plane of \( xz \), the momentum of \( B C b \) is therefore \( \int f(t; r) \); a similar expression will be obtained for \( A C A \), but with a contrary sign, since the pressure relative to \( C b \) and \( A F B \) acts evidently in a contrary direction to the weight of \( A C A \): this negative expression, transposed on the contrary side of the equation, becomes positive, hence \( S_y = \int f(t; r) \); and \( y = \frac{\int f}{S} \phi (i, r) \). The symbol \( \phi \) denotes the integration relatively to the whole floating surface, and of a right line which is the intersection of this surface with the plane of \( xz \), it may therefore be considered as known, but it is not necessarily positive, like \( \int f(t) \) since the elements vary with their signs; therefore the co-ordinate \( y \) of the meta-centre may become either positive, negative, or zero with \( \int f(t; r) \). If the body is cut symmetrically in two equal parts by the plane of \( xz \), \( \int f(t; r) = 0 \) and \( y = 0 \), and the co-ordinate \( x \) of the centre of gravity is given by the formula found above, \( x = \left( \frac{b^t}{S} + a \right) \theta \).

When \( a = 0 \), the centres of gravity, and the displaced fluid, are in the same vertical \( G \), therefore the equilibrium subsists in the new position of the body: this happens when \( a \) being negative, \( a = -a \), but when this is not the case, as the pressure of the fluid acts upwards, it is evident that when \( x \) is positive, the body tends to regain its former position, and the equilibrium is then stable: this happens when \( a \) is positive, or when \( a \) is negative, and at the same time \( b^t > \frac{S}{S} \). Finally, if \( a \) is negative, and \( b^t < \frac{S}{S} \), \( x \) is negative, which denotes that the centre of gravity of a \( F \) is on the other side of the vertical \( G \); the pressure of the fluid then causes the body to deviate more and more from its original position, and the equilibrium is tottering or unstable. This point in the axis of \( z \), which is met by the pressure of the fluid, is called the meta-centre, and hence is derived the theorem mentioned above. That a floating body is in a stable equilibrium when the meta-centre is above the centre of gravity of the body, that the equilibrium is unstable when the meta-centre is below, and that when the two centres coincide the body has no tendency to oscillate. It is evident that the point \( G \) is more or less elevated than the point \( G \), or coincides with it according as the value of \( G \) is positive, negative, or zero.

We shall conclude this article with the following theorem from Dr. Young, which will serve to illustrate the preceding theory.

If a floating body have its section made by the surface of the fluid a parallel-gram, its equilibrium will be flable or tottering, accordingly as the height of its centre of gravity above that of the fluid displaced is smaller or greater than one-twelfth of the cube of the breadth, divided by the area of the transverse vertical section of the immersed part.

Let the body be inclined in a small degree from the position of equilibrium \( A B C \) into the position \( D E F \); then the triangles \( G H I \) and \( J K L \) will be equal, since the area of the section immersed must remain constant, and \( G K \) and \( J L \) will ultimately bisect each other in \( H \). Now the centre of gravity of the section \( I E \) is the common centre of gravity of its parts \( I H M \) and \( I L M \), making \( K M = G I \); but \( N \), the centre of gravity of \( I H M \), is in the line \( H F \), bisecting \( I \), and the common centre of gravity may be found by making \( N O \) parallel to \( H K \) or \( H L \), in the same ratio to the distance of the centre of gravity of \( I H M \) from \( H \), that \( H \) bears to \( I F \). Now the distance of the centre of gravity of any triangle from the vertex is two-thirds of the line which bisects the base, that is, in this case, \( \frac{2}{3} H \), and the area of the triangle \( I H M \) is \( H K \cdot K P \); therefore \( NO = \frac{2}{3} H K \cdot K P \); but drawing \( O Q \) vertically through \( O \), \( N O : N Q = K P : H K \), and \( N Q = NO = \frac{2}{3} H K \cdot K P \); \( H K \cdot K P = \frac{1}{3} I F \cdot F K \). If therefore the centre of gravity \( G \) is in the body, it will remain in its position in any small inclination; since the result of the pressure of the fluid acts in the direction of \( O Q \), if the centre of gravity be below \( G \), it will descend towards the line \( O Q \), and the body will recover its situation; if above \( G \), the body will overtake; hence the point \( Q \) is sometimes called the centre of pressure, or the meta-centre. The theorem may be easily accommodated to bodies of other forms.

**Floating Bridges.** A bridge consisting of several boats covered with planks, which ought to be so solidly framed as to bear both horses and cannon. See Bridge.

**Floating Islands.** See Islands.

**Floating Meadows.** In Rural Economy, the practice of overflowing them with water in order to the improvement of their crops. See Meadow, and Watering Land.

**Floating Vessels.** See Boat, Vessel, &c.

**Floating Upwards.** An old turnus in watering lands, where large dams for keeping up the water were had recourse to.

**Floby,** in Geography, a town of Sweden, in the province of Gotland; 51 miles N. E. of Gothenburg.

**Floc**, a town of Norway, in the diocese of Bromsn; 48 miles E. N. E. of Ramfjord.

**Flock,** a number of sheep kept together under a shepherd. Flocks are sometimes diffused into the pasture, and mountain kinds.

**Flock.** Setting of, the practice of calling and sorting the different kinds of sheep flock. It is usually had recourse to annually for lambs, where sheep husbandry is extensive.

**Flock Paper.** See Paper.
FLODAY, in Geography, one of the smaller Western islands of Scotland. N. lat. 57° 42'. W. long. 7° 13'.

FLODOARD, or FRODOARD, in Biography, an ecclesiastic and historian, was born at Epernay, in Champagne, in 894. He was educated at Rheims, and was appointed keeper of the archives in the cathedral, and afterwards canon. He had other preferments, and in 936 was deputed pope Leo VII. by whom he was kindly received. At length he became an abbot of a monastery in the diocese of Rheims. An attempt was made, in 951, to place him in the see of Noyon, but without success. In 963 he resigned his abbacy, and devoted himself to pious exercises. He is known as an author by "A Collection of Histories in Verse," containing the triumphs of Jesus Christ and his disciples, and the abridged history of all the popes down to Leo VII. and of the most illustrious fathers, &c. He wrote also "A History of the church of Rheims," and "A Chronicle composing the History of the Times from 910 to 966." Moret.

FLOETZ. See FLEETZ.

FLOGEL, CHARLES FREDERIC, in Biography, a learned Silesian author, was born at Jauer, in December 1729. In the year 1774 he was appointed professor of philosophy in the academy of Leignitz, and died in March 1788, at the age of 59. He left behind him many able works, among which was "A History of the Human Understanding," and "A History of the present state of Belles Lettres in Germany." He had read a great deal, and possessed an extensive knowledge of the history of literature, as well as of philosophy and other sciences. He was highly esteemed on account of his integrity and agreeable disposition, and his memory has been immortalized by his excellent works. Gen. Diog.

FLOGNY, in Geography, a town of France, in the department of the Yonne, and chief place of a canton, in the district of Tomerre; six miles S.S.W. of St. Florentin. The place contains 333, and the canton 8376 inhabitants, on a territory of 15.5 kilometres, in 15 communes.

FLOHA, a town of Germany, in the circle of Erzgebirg; six miles E.N.E. of Chemnitz.

FLOHAU, a town of Bohemia, in the circle of Saatz; eight miles S. of Saatz.

FLON, a river of France, which runs into the Arly, about a mile S.W. of Flumet.

FLONE, or FLOEN, a town of France, in the department of the Orthe; eight miles S.S.W. of Liege.

FLONHEIM, a town of France, in the department of the Rhine and Moselle; 12 miles E.S.E. of Cranznach.

FLOOD, a deluge or inundation of waters. See DILUGE.

Flood is also used in speaking of the tide. See TIDE.

When the water is at low, it is called flood; when rising, young, or old flood, when at highest, high flood; when beginning to fall, ebh-water.

Flood-mark, the mark which the sea makes on the shore, at flowing water, and the highest tide: it is also called high-water mark.

Flood Sand. See Sand.

Flood-gate, among Engineers, signified a gate or sluice which can be opened or shut at pleasure to retain or give passage to the water of a river liable to be swelled by floods. Flood-gates are necessary in many situations upon rivers where the water is retained for the service of mills, canals, navigations, docks, &c.; in those only a certain quantity of the stream can be employed, and the surplus in time of a flood must be suffered to escape by another passage. For instance, in the case of mills upon a large and rapid river, the stream of water is intercepted by a weir erected across it, and penned up the proper height to obtain a sufficient fall for the mill, which is situated by the side of the river, with a channel leading from above the weir, to convey the water to the mill, whilst another conducts it into the river below the weir. In ordinary times this arrangement is sufficient, for whenever the mill is not in action, the water which would otherwise pass through it, flows over the weir, and escapes into the river below. Now if the sudden falling of rain, or melting of snow, causes a flood in the river, it often happens that the length of the weir is insufficient to vent the torrent of water coming down; and without some contrivance answering the purpose of a flood gate, to give passage to the water, it becomes penned up many feet above the crown, or highest level of the weir, inundating the lands adjacent to the channel, above the weir. If the river is provided with a proper flood-gate, it acts, when open, in the same manner as removing a part of the weir, and allows the water to pass down quietly without rising much above the level which is common in ordinary times. From this, the use of a flood-gate will be comprehended; navigable rivers, which are penned up to form locks, require flood-gates, which are applied in the same manner as before-mentioned.

Flood-gates may be constructed in various forms; but it is indispensable that they should be capable of being opened or shut during the time when a pressure of water is acting against them. Small gates are always made to slide up and down in a groove in the manner of a sluice; some very considerable rivers are furnished with a number of such small draw-gates, which open a great extent of water, when drawn up. In the most extensive works it is necessary to make use of a different kind of gate, which can be opened or shut with greater ease than a number of shuttles, and which will lay open a more extensive passage; for in violent floods it is not uncommon for large trees, bushes, hay ricks, thatched roofs of low buildings, &c. to be brought away by the torrent; and if the flood-gates have any obstruction, these matters accumulate before the passage, and, when the flood lasts long, frequently choke up the gate, and the water overflows its banks. To avoid such accidents is the study of the engineer in constructing works of this kind; the late Mr. Smeaton designed several flood-gates, in which the pressure of the water was balanced, so that the gate at any time could be opened or shut with ease, even while the pressure of the water was acting against it on one side only. Figures 5 and 6 of Plate XV. Miscellanies, is a plan, and fig. 2, an elevation of this contrivance; A A B represents a channel made through the weir, or, if more convenient to suit the local circumstances, it is made by the side of the river, leading from above the weir to below it; this channel must be substantially built in masonry to resist the violent action of the water rushing through it when the gate is opened; in some convenient part of this passage a float beam C is placed across the bottom, and another, D, across the top, both firmly bedded in masonry; these support the gudgeons of the vertical axis E of the gate F F. When this gate is turned so as to present its edge to the current, the water has free passage by it, and on the other hand, when it is placed perpendicularly across the channel, the whole of the water is detained: the axis of the gate is placed so as to pass very nearly through the centre of pressure of the superfoies exposed to the action of the water; and as the pressure of the surfaces on each side of the
FLOOD-GATE.

axis so as to turn the gate in contrary directions, they balance each other, and the gate may be turned with scarcely any other friction than the friction of its gudgeons. The gate must necessarily be framed exceedingly strong to bear the great weight of the water acting against it, without yielding. G, H, are two ground-cills firmly bolted down upon the floor of the conduit and the piles which are beneath it; one of the arms of each of these cills support the gate when shut, and the other arms fill it when open, as is clearly shown by the figure; these must be very firmly fixed to avoid any danger of the gate removing them; one of the upright sides of the gate is supported by bolting into a recess made in the masonry of the conduit, and to keep the other side of the gate up to its sill, a lever, called a vallet, which is in the form of a triangle K, and moves upon a vertical axis placed in a recess in the masonry so as to be out of the way of the gate's motion, when placed in the position at fig. 5, leaving the gate at liberty to open; in the other position it acts as a lever to close the gate, being drawn tight by tackle, and afterwards hauled by a small line to the beam D. The gate is retained shut, but can be opened instantaneously by cutting the line; and as the gate is made rather larger on the side of the axis where the vallet is placed, that it may have a tendency to open when released by the preponderating preffure on one side. The gate in question is 15 feet in height, and the seam in breadth; when open, it allows two passages of 15 feet by 6 feet, 3 inches in width; the gate is to be shut by the application of a capstan and blocks, for which purpose eye-bolts are provided upon the proper points of the gates and beam D.

This gate, though very proper for large rivers where a watchman must be in constant attendance to open and shut it when necessary, is not so applicable as a common sluice to a small mill-dam, where, if a sudden flood occurs in the night, the miller must rise to open the gate; and, unless he constantly attends to shut it when the flood subsides, the mill-dam may be emptied and the water lost, which he would wish to reserve for the ensuing day. Great complaints are frequently made in the country of lands being overflowed in the night when the miller is not in the way to open his flood-gate; to remedy this a self-acting flood-gate would be desirable, and we beg leave to suggest the following. Let A A, fig. 7, be a gate similar to the one before mentioned, but of smaller dimensions, and placed upon a horizontal axis passing rather above the centre of preffure of the gate, so as to give it a tendency to shut close: a a is a lever fixed perpendicular to the gate, and connected by an iron rod with a cask b floating upon the surface of the water, when it rests to the line h, which is assumed as a level of the weir or mill-dam E E, in which the flood-gate is placed; by this arrangement it will be seen, that when the water rises above the dam, it floats the cask, opens the gate, and allowing the water to escape until its surface subsides at the proper level B D; the cask now acts by its weight, when unsupported by the water, to close the gate and prevent eakage; the gate should be fitted into a frame of timber H K, which is set in the masonry of the dam, the upper beam H of the frame being just level with the crown of the dam, so that the water runs over the top of the gate, at the same time that it passes through it; to prevent the current disturbing the cask it is connected by a small rod c at each end to the upper beam H of the frame, and joined in such a manner as to admit of motion in a vertical direction.

This flood-gate would be very useful in mill-dams of small dimension, which are therefore liable to be suddenly overflowed, for being self-acting, it requires no attendance, and from its simplicity is not very liable to be deranged, as before mentioned; for large rivers the principal object is, to open a great extent of water-way, which will admit the passage of large bodies brought down by the stream; Mr. Smeaton's gate above mentioned, as the axis is always in the channel, would be liable to be choked by trees, &c.; for this reason large sluices or shutters are very generally adopted, though the great power and expensive machinery required to raise such gates are an objection.

A flood-gate lately erected by Mr. Barlow is the most perfect in this respect of any that we have met with; it is raised (on the hydrostatic principle which he has so successfully applied to many other useful purposes) with such facility, that a passage 19 feet wide, and 10 feet high, can be opened by one man in 15 minutes, and this when the pressure of 10 feet of water is acting on one side only. Fig. 8, is an elevation of this gate, and fig. 9, an horizontal section; A, A, represent two large beams which are partly received into the masonry of the conduit; the lower ends are framed into a strong ground-cill B, and the upper ends connected by a framing; this forms a frame in which the gate rides and falls: it is guided in its motion by two iron plates a, a, bolted to the sides of the gate, forming a groove, as shown in the plan. Two square pieces of cast iron, denoted by b, b, and the dark shading in the plan, are bolted against the inner surfaces of the beams A, A, and received into the grooves of the gate, to confine it to move in a vertical direction; these pieces of iron have cylindrical chambers through them, as shown by the small white circles in the plan, to admit two polished iron cylinders d, d, attached to the end of the upper rail D D of the ornamental framing on the top of the gate; a close fitting is made round the cylinders d, d, by leathers confined with screws to prevent them from the top of the iron barrels, so that no fluid can pass out of the chambers in the barrels b, b, &c., in the plan, are two small pipes communicating with the chambers at the bottom of each barrel, and these pipes are united at f, proceeding to a pump, by which water is injected into the two chambers together; and as this fluid is incomprehensible, it follows that the cylinders d, d, must be forced out of their respective chambers raising up the gate. As the area of the pump is much less than that of the cylinders, and as it supplies two of them, it follows that the motion of the piston of the pump will inject such a quantity of water as, when distributed into the two chambers, produces a very small protrusion of the cylinders; it is on this principle of the differences of the two motions that the power is gained: the area of the pump in the present instance is 7.854 of a square inch, and the cylinders about 7.27 square inches, or nine times as much; by this means a power is gained in the two cylinders equal to 18 times the force exerted upon the piston of the pump, which being moved by a lever multiplying the power ten times, the power of a man applied to the pump is increased 80 times; so that a weight of 100 lbs. applied to the lever, will raise 18,000 lbs. on the piston rods.

The pump may be placed at any convenient distance from the gate, a small copper tube only half an inch diameter conducting the water into the cylinders in many situations this will be extremely convenient, as it obviates the necessity of an expensive scaffold or framing over the gate, which is indispensible in other situations to support the labourers and the machinery for drawing up the gate; the pump is explained by figs. 10, and 11, on a much larger scale than the other parts; b is a sifter containing water, and the pump-barrel fixed perpendicular in it; the plunger of polished iron is solid, a and leather packed round it is a winder handle.;
similar to the cylinder; it is confined to a rectilinear motion by sliding through a fixed socket at the upper end, and in the middle it has an opening to admit of a lever $m$, by which the pump is moved; it is connected with the rod by a coupling rod within the opening, which allows its deviations from the rectilinear motion; the pump has two valves, the one is situated in the bottom of the barrel at $n$, and the other in the pipe beneath $p$; its action is similar to the ordinary force pump, inhaling the water into the barrel when the piston is lifted up, and expelling it through the pipe $f$ when forced down; at $p$ is a head-yard and weight acting upon a small valve, which permits the escape of the water if the preasure should be so great as to endanger the rupture of the pipes when the gate is lifted up to the top of its frame; hence it is termed the safety-valve: it should never be loaded with a greater weight than will keep the valve shut against a sufficient preasure to elevate the gate. At $r$ is a cock which discharges the water from the pipe into the cistern, and permits the descent of the gate. To refit the great preasure of the water against the gate, it is strengthened by three trussed frames, represented by $l, k, l$, in the elevation, fig. 8, and in the plan; each truss is an iron rod attached to the gate at each end, and supported in the middle by a block, which answers the purpose of a king-post: the rods can be drawn tight by iron wedges passing through the gate; therefore it is evident that in this state the gate cannot yield to the preasure of the water, unless one rod is shortened and the other stretched; these frames render the gate so stiff that it does not show any signs of weakness when the preasure acts against it; the trusses are placed nearer together at the lower part of the gate, where the greatest strength is wanted.

The limits of our plate do not allow us to do justice to the precise and more minute parts of this admirable invention, but as these will again come under our notice in the article Press, Hydrostatic, we refer the more complete elucidation of the pump, mode of packing the cylinders, &c. to the plates belonging to that article. It should be noticed, that the gate represented in our figure is intended to admit the passage of loaded barges beneath it, and is therefore much higher in the frame $AA$ than would be necessary for flood-gates in all situations; it would form a most excellent sluice for clearing out harbours from mud, as the torrent of water it lets out would be much more effective than three or four of the small sluices at present in use.

Flood-bridge signifies a low bridge constructed for the towing-path of a canal, over a weir or overflow for discharging superfluous water. See Canal.

Flood-bolt signifies a tide lock, or that opening into the sea, or a tidal river.

FLOODING, Proflumций Sanguinis, in Surgery, may be applied to any unnatural or profuse discharge of blood from the uterus. The most common of these is profuse menstruation, or an increased discharge of the menstrual flux, (see Menstrues), or those discharges of blood from the uterus, which precede, and not unfrequently occasion abortion. (See Abortion.) The hemorrhage also, which follows a partial or total separation of the placenta from the uterus, if profuse, whether it takes place before or after the birth of the child, is called a flooding. Flooding is sometimes, though rarely, occasioned by falls or blows, and sometimes by ulcers, polypi, or other diseases of the uterus. In all cases of flooding the patient should be confined, as much as conveniently may be, to a recumbent posture, the body should be kept cool and open, and a few spoonfuls of the infusion of red roses should be given two or three times in the day, adding to the portion given at night from five to ten drops of the tincture of opium.

Flooding Land, in Agriculture, is the practice of flooding, or covering grass lands with the water of rivers, &c. at particular seasons. In this mode the water is suffered to remain upon the ground for a considerable length of time, which is quite different to that of irrigation, in which it constantly runs off as fast as it is brought upon the land. This method has probably been introduced in conformance of observing the fertilizing effects that take place after pasture lands have been overflowed with water for some time in the winter season. This plan of watering is of vast importance in mossy meadows, even where the water is perfectly clear and free from any material that is capable of being deposited.

In preparing lands for being flooded, there are two circumstances that must be particularly regarded, namely, first, to lay them as level as possible, either by dividing them into different levels, or any other means; and secondly, to convey the water upon them in the most safe and convenient manner for the cultivation of the surrounding grounds. In sandy or mossy lands, this is often not accomplished without considerable difficulty. See Watering Land.

FLOOD, in Building, the under-side of a room, or that part on which we walk, or perform different operations, such as threshing, dressing, and measuring grain, &c.

Floors are of divers sorts; some of earth, some of brick, others of stone, others of boards, &c.

Carpenters, by the word floor, understand as well the frame-work of timber, as the boarding over it. The supporting timbers are called naked flooring, which fife. The boarding is also of different kinds, as batten floors, common boarded floors, dowelled floors, and straight-jointed floors.

For brick and stone-floor, see Pavement.

For boarded floors, it is observable, that the carpenters never floor their rooms with boards, till the ceiling is set up, and also inclining with walls, lest the weather should injure the flooring. Yet they generally rough-plane their boards for the flooring, before they begin any thing else about the building, that they may set them to dry and season, which is done in the most careful manner. This operation should be performed for at least one year, so that the natural sap may be thoroughly expelled. The best wood for flooring is the fine yellow deal well seasoned, which, when well laid, will keep its colour for a long while; whereas the white fort becomes black by often washing, and looks very bad. The battens used for flooring are of three kinds: the bell is that free of knots, shakes, tap, and crofs grained fibres, well matched. The second kind is that in which only small, but found knots are permitted, and free of shakes and tap. The third and common kind is that which remains after taking away the bell and second bell.

With respect to the joints of flooring boards, they are either quite square, or plowed and tongued, or rebated, or dowelled. In fixing them, they are either nailed upon one or both edges. They are always necessarily nailed upon both edges, when square jointed, without dowels.

When
When they are dowelled, they may be nailed on one or both edges, though one edge only is necessary; and in the best dowelled work there are no brads or nails seen whatever, the outer edge being fastened by driving the nail obliquely through the wood, without piercing the upper surface; so that the floor, when planed off, appears without blemish.

In laying boarded floors, the boards are sometimes laid one after the other; or otherwise one is laid flat down, then the fourth, leaving an interval somewhat less than the breadth of the second and third together. The intermediate boards are next laid in their places, with an edge of the one upon the edge of the first board, and an edge of the third upon the inner edge of the fourth, and the two middle edges together, which will form a ridge; to which level, two or more workmen jump upon it, till they have made the under surface coincident with the joists, then they are nailed down in their places. The operation is called folding floors, and the boards are laid to be folded. This mode is only taken when the boards are not sufficiently seasoned, or suspected to be so. In order to make close work, it is obvious that the two edges forming the joint of the second and third boards must make angles, with the faces, together less than two right angles, or each one of each board less than a right angle. The seventh board is fixed as the fourth, and the fifth and sixth inserted as the second and third, and so on till completed. In this kind of flooring the headings are generally square or splayed.

When floors are dowelled, the regulating line for the centre of the dowels should be drawn from the lower side, which as has been observed, ought to be straightened on purpose. The distances to which the dowels are set are from six to eight inches, generally one over each joint, and one over each inter-joint.

When it is necessary to have a heading joint in the length of the floor, it should always be upon a joint; one heading joint should never meet another. In dowelled floors the heading points are always plowed and tongued.

In common floors the boards are added on the lower side, in order to bring them to a thickness between rebated edges. In doing this, great care should be taken so as not to make them too thin, which is frequently the case; they must then be raised with chips, which is a very unsuitable residence to a pressure upon the floor. The nature of measuring floors is by squares of ten feet each side, so that taking the length and breadth, and multiplying them together, and cutting off two decimals, the content of a floor in squares will be given. Thus 18 by 16 gives 288 of 2 squares and 38 decimal parts.

Floors, Earthen, are commonly made of loam, and sometimes, especially to make mellow on, of lime, and brock- fand, and gun-duff, or awl-duff from the forge; the whole being well wrought up and blended together with blood. The fillings of lime-duff have also been found highly useful when formed into floors in this way.

On blood and fine clay, tempered together, Sir Hugh Plat says, make the finest floor in the world. The principal object in constructing floors of this nature is that of blending and incorporating the different substances in a full and perfect manner for some time before they are laid; and when that is done they should be repeatedly beaten down and rendered perfectly smooth and even.

The manner of making earthen floors for plain country habitations is as follows. Take two-thirds of lime, and one of coal ashes well fitted, with a small quantity of loam clay; mix the whole together, and temper it well with water, making it up into a heap; let it lie a week or ten days, and then temper it over again. After this, heap it up for three or four days, and repeat the tempering very high, till it become smooth, yielding, tough, and gliny. The ground being then levelled, lay the floor therewith about 2½ or 3 inches thick, making it smooth with a trowel: the hotter the season is the better; and when it is thoroughly dried, it will make the best floor for houses, especially malt-houses.

If any one would have their floors look better, let them take lime made of rag-flones, well tempered with whites of eggs, covering the floor about half an inch thick with it, before the under flooring is too dry. If this be well done, and thoroughly dried, it will look, when rubbed with a little oil, as transparent as metal or glass. In elegant houses, floors of this nature are made of stucco or of plaster of Paris beaten and sifted, and mixed with other ingredients. Well wrought coarse plaster likewise makes excellent fine upper-floors, for cottages, out-houses, &c. when nately spread out upon good strong laths or reed.

See Plaster-floor.

Floor of a ship, strictly taken, is only so much of her bottom which lies on, when aground.

Such ships as have long, and withal broad floors, lie on the ground with most security, and are not apt to feel, or tilt on one side; whereas others, which are narrow in the floor, or, in the phrase, 'cranked by the ground,' cannot be grounded without danger of being over-turned.

Floor-timbers, in a Ship, are those parts of a ship's timbers which are placed immediately across the keel, and upon which the bottom of the ship is framed; to these the upper parts of the timbers are united, being only a continuation of floor-timbers upwards.

Floor, in Mining, or sole, till, or pound stone, signifies the bottom of the work in a mine, or in coal-mining, the stratum immediately under the coal-heap; which, if soft, the upper part of it for six or eight inches in height generally is “holed in,” as the colliers call it, that is, the same is picked out in order to undermine or loosen the coal, but if the floor be hard, as clunch is, the holding or picking is then made in the bottom or some inferior bed of the coal itself, in order to under-go or give room for wedging down the blocks or webs of coal. In examining and comparing the fillings of the numerous coal-pits in Derbyshire and Nottinghamshire, Mr. Fairley lately discovered, what seems likely to prove a general and important geological fact, viz. that the floor of every coal is a freemake, more or less thick, more or less perfect in its innumerable property, and more or less indurated; sometimes being in a soft or ductile state, when it is called floor, spar, fire-clay, pipe-clay, (if white,) potter's-clay, brick-clay, &c. at others, in an indurated or almost flinty state, but which it quickly loses and falls to clay, on exposure to the atmosphere, in which case it is called clunch, which is the same that the floor of coal most generally bears. This new fact appears to throw a great degree of light on the new theory of the formation of coal, near the end of our article Colliery, by rendering it probable that the growth of the subaqueous beds of vegetables there spoken of were produced by this peculiar subsidence as their fall or pelabum.

Floor, a superficial measure of 400 square feet or docking, is a square whose side is 20 feet, and occurs in the facing of the sewer-hanks, and in other works on the sides of Cambridgehire and Norfolk, &c.

Floor, a solid measure of 400 cubic feet, or a superficial floor, one foot thick, used in measuring the pitch dug to obtain earth for forming the banks against the tide or rivers in the lines of the eastern coal. (Smeaton's Reports, vol. i. p. 330.)
Floquet was born at Aix in Provence, 1750; and was the first musical author that was called for by the audience to be crowned, and to receive on the stage their approbation in person. A mass of his composition was performed in the cathedral at Aix before he was eleven years old. In 1774 he set another opera, which not having the fame success as the first, he determined to travel into Italy to receive instructions from the most able masters of that country, and obtained them for some time at Naples, under the celebrated Saba, the worthy successor of Durante, and master of the Conservatorio de la Piet&#232;, which had furnished the musical art, and all Europe, with so many great masters. On quitting Naples he went to Bologna, and had the further advantage of receiving instructions from the profound father Martini, the greatest theorist that Italy has ever produced. A Te Deum, a de Cori, of his composition, was performed at Naples with great success; and he was admitted of the Philharmonic Society at Bologna; it is however known, that to be received into that academy, it is necessary for a candidate to give proofs of his abilities three several nights; but M. Floquet performed all the several exercises the same evening, and composed in two hours and a half, on canto fermo, a f gue in five parts, and the verfe cruxiex of the credo; so that he was immediately received unanimously. On his return to France, he composed the opera of Helle, performed in 1778, but which had no success; but not that the music manifested the progress which the young Floquet had made in his art; but from the badness of the works enfla a total want of interest in the subject. This composer was ill advised by friends to attempt giving meaning to a drama so detestably dull. We advise him to be more cautious in future in the choice of his works, and will venture to answer for his successes. Laborde, 1780.

Flora, in Mythology. See Florales Ludii.

Flora, in Botany, is very generally applied as a title to books whose professed object is to enumerate, define, or fully describe the wild plants of any particular country or district. Publications of this kind, with which the botanical library at the present day abounds, are not less various in their scope than in their merits. Some are mere catalogues, disposed either in alphabetical or systematic order, while others are compendious histories of the plants they enumerate, respecting not only their botanical characters and distinctions, but also their scientific history, and even that of animals connected with them, as well as their actual or probable uses and qualities. Of this last kind, the Flora Lap-
The materials, which illustrate the may be praiseful, them is unequal, some from perpetual its lead is p.

tions is rare

Synopis, out a nononymy in knowledge. generic every propensity love very few

Willdenow's T Flora accurate answer has Dillenius, from Hudfob in our Flora, in the former our plants, or carcan, and under Catalogues of plants, or Catalogues of Gardens, have generally implicitly adopted his definitions, at least his generic ones, fearfully presuming they could he incorrect. Some mistakes having thence arisen, which the introduction of the Linnean herbarium into this country first led us to correct, the author of the Flora Britannica judged it necessary to bring every definition to the letter of examination, such being one of the few means left him, after the labours of so many able preceding botanists, to render his work importantly useful. With regard to species indeed, Mr. Hudson, when he found the Linnean specific characters not accord with his own plants, very properly, and often advantageously, reform them, but he by no means detected every error of this kind. On the other hand, too great a propensity to correct and reform should not lead us, in cases where one idea or expression is as good as another, and certainly preferable, from being already adopted, to make alterations in the face of shewing our zeal; for it is very probable we may alter for the worse, though our self-love will make us the last to perceive it.

T is leads me to consider the subject of systems, or methodical arrangement, which the writer of a Flora should well confider before he aims at distinction by any reformation in that department. He would be wise, in the first place, to adopt the most popular and easy system, and hence molt persons have followed that of Linneus. Some excellent and original writers in this line have chosen methods of their own, which, from some of their transgressions or imperfections, can not be considered much better than those they deceived; as Villars in his Flora of Dauphiny, Allioni in his Flora Pedemontana, Gerard in his Flora Galloprovincialis, and Seppel in the first edition of his Flora Carnitica, though in the second he widely adopted the Linnean arrangement. Whether the systems of these writers possess any merit or not, nobody thinks it worth while to examine. The reader results at them as a perpetual inconvenience. A Flora is too limited a theatre for the display of a new botanic system, and we expect a different kind of information from it, which it is the writer's duty to give us in the safest, most intelligible form, without troubling us to learn a new language on purpose. In early times indeed, before any system was regularly established, it became leading botanists, like Ray, to attempt to teach the world some scientific principles; but not the great man concurred, in his first catalogue of British plants, to give an alphabetical arrangement, as did a scarcely less excellent writer in this department. Magnesium in his Botanicon Manufacrenis. An alphabetical arrangement is, at any rate, unexceptionable, not proving a hindrance, if it affords no scientific aid.

Some Floras, besides scientific definitions, descriptions, or synonyms, are illustrated with figures, a very useful though sometimes expensive addition; as the Flora Lindencitrn above-mentioned, the English Botany, Jacquin's splendid Flora Austriaca, to which the Plante Rariores Hungarice by Waldstein and Kitabeh are a sort of sequel, as is also the still more splendid Flora Greaca, published according to the will of the late professor, John Sibthorpe of Oxford. The Flora Danica consists of little else than plates, which may be had either coloured or plain. The Flora Rustica of Pallas, intended, by its original patrons, to crown every work of the kind, and to be belted gratuitously on every person worthy to possess it throughout Europe, very soon proved abortive, and became a job in the hands of those entrusted with its publication; nor is the execution of the plates to be commended, they having often been coloured from dried specimens. Of extra-European Floras illustrated with plates, though uncoloured, the Hortus Malabaricus of Rheede, Herbarium Amblyopus of Rumphius, and the recent Flora Peruiciana by Ruiz and Pavon, are the most magnificent. The performances of the Burmanns in this line are but indifferent, though much quoted by Linnaeus. The Flora Japonica of the celebrated Thunberg is valuable for the novelty of its materials, but nothing can be more rude than his figures subsequently published to illustrate it. In point of novelty nothing can exceed the Nota Holandica Plantarum Specim. by Lobbardus, full of useful, though not elegant plates, nor is it likely a most inferior to any. The elegant Flora Atlantica of his countryman Desfontaines, with more beautiful plates, though less singularity of materials, deserves no less commendation.

We cannot attempt in the compus of this article to mention, still less to do justice to the merits of, every Flora that has appeared. We refer the reader to the article Figures of Plants for some remarks connected with the subject. More particular notice of several of the publications alluded to, as well as an account of many similar ones.
from another passage in Varro it appears, that there were
priests of Flora with sacrifices, &c. as early as the times of
Romulus and Numa. To which we may add that Pliny
(1. xxxiv. c. 4.) speaks of a statue of this goddess by the
hand of Praxiteles, which proves that her worship was
famous in Greece, whence it was propagated to Italy,
long before Romulus, who adopted it, when he entered into
an allocution with Tatius and the Sabines. Moreover, we
learn from Julius, that the Phoceans, who built Marselles,
worshipped the same goddess.

FLORAL GAMES. There is also a kind of floral
games observed at this day in France; first instituted in
1324.

The design and establishment were owing to seven persons
of condition, lovers of poetry, who, about All-saints-day,
in 1323, sent a circular letter to all the Provençal poets,
called Troubadours, to meet at Thouolute on May-day
following, there to rehearse their poems; promising a prize
of a violet of gold to the person whose piece should be
judged the best.

The capitouls found the design so good, that it was after-
wards resolved at a council of the city, to continue it at
the city-charges; and this was done in a manner that did honour
to the place.

In 1325, a chancellor and secretary of the new academy
were chosen; and the seven initiators took the quality of
maintainers thereof. Two other prizes were afterwards
added to the violet; viz. an eglantine for the second prize,
and a panzy for the third. It was also decreed, that the
person who bore away the first prize, might demand to be
made bachelor; and that whoever bore away all three,
should be created doctor in the gay science, that is, in
poetry.

There is a registre of these games kept at Thouolute,
which gives this account of their origin; though others
represent the matter differently. It was an ancient custom
they say, for the poets of Provence to meet yearly at Thou-
loule, to confer together, rehearse their verses, and receive
a prize allotted to the best performance. This held till
about the year 1540, when a lady of quality left the best
part of her fortune to endow the custom, and bear the
expenze of prizes; the number of which she increased,
ordering an eglantine, a panzy, a violet, and a pink: the
three first, a cubit high; and worth fifteen piliotes a piece.

The ceremony began on May-day, with a solemn mass,
music, &c. The corporation attended; and poems were
rehearsed every day: the third day a magnificent treat was
given by the magistracy, &c. and that day the prizes were
adjudged. The three prizes were the reward of three dif-
ferent kinds of compositions; viz. a poem, an elegy, and
an ode.

FLORALIA, in Antiquity, a general name for the
feals, games, and other ceremonies, held in honour of the
goddes Flora.

FLORENCE, in Geography, the capital city of Etrus-
cia, (which see), and regarded as the Athens of modern
Italy, is situated on the river Arno, at the foot of the Apen-
nines. The Arno divides it into two unequal parts, over
which there are no fewer than four bridges in sight of each
other. That called the Ponta della Trinita, is uncommonly
elegant, being built entirely of white marble, and orna-
mented with four beautiful statues, representing the four
seasons. The quays, the buildings on each side, and the
bridges, render that part of Florence, through which the
river runs, by far the finest. Florence was first founded
by the soldiers of Sylla, embellished and enlarged by the
triunvirs
triumvir, destroyed by Tullia, and rebuilt by Charle-
magne. The environs of this city are beautiful, rich, and
populous; containing, as it has been said, 65,000 villas or
country-houses. The habitations of the peasants likewise
seem to be peculiarly neat and commodious; the country
all round is divided into small farms, with a neat farm
house on each. The circumference of the city is about
two leagues; the fortifications consist only of a wall and
ditch, with two or three forts which defend it, and
command a part of the town. This city vies, as to beauty,
with Rome itself. The buildings are magnificent, most of
the streets clean, paved with square stones, so as to have
the appearance of a rock made level; they are generally
winding, and many of them too narrow for carriages to pass
each other. They reckon 17 public places, or squares;
seven fountains constantly playing, six pillars or columns,
two pyramids, 160 beautiful statues, placed either in the
public squares, or in the streets, or in the front of some
palaces; one metropolitan church, 12 collegiate, and 44
parochial; 35 convents for men, 60 for women, 37 hos-
pitals, and about 9,000 hospices. The number of inhabi-
tants is estimated at eighty thousand. Florence has been
equally distinguished by a spirit of commerce, and for
the fine arts; some of the Florentine merchants were
formerly men of great wealth, and lived in a most
magnificent manner. One of them, about the middle of
the 15th century, built that noble fabric, which, from
the name of its founder, is still called the Palazzo Pitti. The
building was raised by the expense; but the palace con-
tinued to be the residence of the sovereigns. The gardens
belonging to this palace are on the declivity of an eminence.
On the summits there is a kind of fort, called Belvedere,
from which, as well as from some of the higher walks, you
have a complete view of the city, and the beautiful vale of
Arno, in the middle of which it stands. The prospect is
bouded on every side by an amphitheatre of fertile hills,
adorned with country-houses and gardens. In this palace
is a library containing about 35,000 volumes, with a great
number of pictures by Raphael, Rubens, Titian, Andrea-
del-Sarto, Titoreto, Guercino, &c. The Palazzo Vecchio,
or old palace, contains a room 172 feet long, and 72 wide,
for public entertainments, in which the most celebrated
actions of the republic are painted by Vafarini in fresco; and
in the corners are four capital historical pictures by Cigoli,
Ligazzi and Passignani. These two palaces are connected
by a gallery, which presents an inexhaustible fund of im-
proving amusement in sculpture and painting, to which the
public have daily access. In this place was instituted a ce-
nobled society for the improvement of the Italian language,
called "Academia della Crusca," (see Academy;) and
yet the Florentines are noted for bad pronunciation of their
language, accompanied with a guttural accent, though they
write it with great elegance; whence has arisen the proverb,
"Lingua Toscania, in bocca Romana." In Florence there
are several theatres, all open during the carnival, which be-
gins on the day after Christmas day, and lasts till Ash-
Wednesday. At other times one of them only is open, except
in Lent and Advent. The two principal are the Pergola,
finished in 1755, and the new Opera-houses, first opened in
the year 1779. The manufactures of Florence are chiefly
silks and satins of excellent fabric. The woollen manu-
facture, to which it was indebted for its splendour and
opulence, has so much declined as scarcely to suffice for the
supply of the common people. At Doccia, three leagues
from the city, is a manufacture of porcelain. The Floren-
tines have been long famous for their Mosaic work, which
is formed of the inner marbles, agates, jaspers, and other
hard stones, some thin, and inlaid in form of birds, flowers,
&c. The wine of the adjacent country is excellent, and
furnishes a considerable trade in Italy and other countries.
Society is maintained with ease and freedom in this city,
besides their conversation, many of the nobility meet every
day at a house called the "Cafino," and these meetings bear
some resemblance to the clubs of London. They also pay and
receive visits at the opera, where the dancing engages a much
greater degree of attention than the music. The country sur-
rounding Florence, or the Florentin, is one of the most
fertile countries in Italy. Florence is situated 125 miles
N.N.W. of Rome. N. lat. 43° 50'. E. long. 11° 14'.

Florence-Court, a small port-town of Ireland, in the
county of Fermanagh, adjoining which is the Earl of Enniff-
kinen has a beautiful seat, with very extensive plantations.
It is in the western part of the country, about 74 miles
N.W. from Dunkirk, and 6 from Enniskillen.

Florence, a town of France, in the department of the
Somme and Meuse, and chief place of a canton, in the
district of Dinant; 16 miles S.W. of Namur. The place
contains 14,101, and the canton 6,711 inhabitants, in 22
communes, on a territory of 240 kilometres.

Florence, a town of France, in the department of the
Hérault, and chief place of a canton, in the district
of Béziers; 10 miles S. of Béziers. The place contains
1740, and the canton 4,990 inhabitants, in 4 communes,
on a territory of 1751 kilometres.

Florence, a town of France, in the department of
Golo, in the island of Corfu, and in the district of
Corfica; containing in its cantons 1,487 inhabitants.—Also,
a town of France, in the department of the Maine and
Loire, and chief place of a canton, in the district of Beauré;
19 miles W.S.W. of Angers. The place contains 1,125;
and the canton 10,101 inhabitants, on a territorial extent
of 190 kilometres, in 10 communes.—Also, a town of France,
in the department of the Cher, seated on the Cher; 7 miles
S.W. of Bourges.

Florentin, a town of France, in the department of the
Yonne, and principal place of a canton, in the district
of Auxerre; 13 miles N.N.E. of Auxerre. The place contains
3,210, and the canton 9,740 inhabitants, on a territory
of 1624 kilometres, in 12 communes.

Florentine. See Florence and Mosaic Work.

Florentine, in the Manufactory of Cloth, is the term
used for a species of satin or tweedilk, which has evi-
dently been either originally or extensively practiced at
Florence. As from its very nature it must always prove an
expensive article of dress, accessible only to the rich parts
of any country or community, it must be deemed of small,
or at least secondary importance in one, where the extension
and success of every article of manufacture depend almost
exclusively on the lowness of the price at which it can be
furnished to the consumer, after frequently paying the pro-
fits of many intermediate agents. It may, however, be
proper to preserve and record the manner of executing it;
although it is by no means probable that it is likely to be
introduced as a matter of traffic in Britain. This descrip-
tion of satin or tweedilk is generally very fine and close
in the fabric. It is woven with sixteen leaves of heddles,
and two or three reeds placed parallel to, and at a small
distance from, each other. It is the most comprehensive
kind of what is called Broken or alternate tweeding. Its
only variety from other tweeds consists in the superior rich-
ness of appearance, which this extensive apparatus gives it.
Below is a plan of the draught and coiling, by which it is
effected.
From the cloisons of the fabric, it would prove very inconvenient, if not absolutely impracticable, to weave goods of this kind in a single reed: for so many threads must be crowded together in every interval, that, in rigging and sinking, they must impede each other so much, that the shuttle could seldom, if ever, find a clear passage between the raised and sunk warp. To obviate this inconvenience, the additional reeds are used; the threads which pass through the same interval in the last reed being divided in the second, and again in the third, by which means both the friction and tendency to obstruction are so much lessened as to render the operation comparatively easy; although in fabrics of cloths, it will require the most close and unremitting attention in the weaver to keep his warp in proper order, and his shed or passage for the shuttle thoroughly open. The mode of placing the reeds seems very similar in plan and effect to the mode adopted by practical geometerians, of dividing small distances with accuracy by means of the diagonal scale.

FLORENTINE, in Geography, a town of France, in the department of Fercé, and chief place of a canton, in the district of Neufchâtel. The place contains 1,268, and the canton 6,072 inhabitants, in 15 communes, on a territory of 287.25 square kilometres.

FLORENCE, in Botany, a town of European Turkey, in Moldavia; 60 miles E. of Stephanowze.

FLOREAT, in Botany, a flower, is applied to the individuals which all together compose either a compound or aggregate flower, but more especially the former. Flowers of compound flowers are invariably monopetalous and superior. They are of two kinds, ligulate or strap-shaped, as in the radial margin of a daisy, sunflower or marigold; or tubular, as in the disk, or central part, of the same flowers. Ligulate florets are toothed at their extremity, more or less equally, the number of their teeth being usually five, more rarely but three. Tubular florets have a regular border, cut into equal spreading segments, almost universally five in number; in Eclipta, however, they are but four, and in one species of Scutellaria, the fenestralis, no more than three. The filaments, whose filaments are inserted into the tube, always agree in number with the segments of the flower. The generality of florets, whether ligulate or tubular, have a perfect or fertile pistil as well as stamens. In the diminutive marginal florets of the Gnaphalium and Artemisia, whose corolla is ligulate indeed, but so rolled up, or coiled by its edges, as to form a capillary tube, the pistil is very perfect, though the stamens are wanting.

Some compound flowers consist entirely of ligulate florets, which in that case are all perfect, furnished with stamens and
and pilli, and fertile. These are the *semisterculis* of Tournefort, and make the first section in Linnaeus’s *Syngenesia Polygamiarum aquilina*, as the Dandechon, Souththiile, Hawkweed, &c. Such flowers are generally yellow, sometimes blue, very rarely reddish. They expand in a morning, and close towards noon, or in cloudy weather. Other flowers, when young, are found of tubular florists only, as the Thistle, and *Bidens*. The greater number consist partly of tubular, and partly of ligulate ones, and the latter are always marginal, or external with respect to the former. Very frequently the marginal ligulate florists, though furnished with an apparent pillar, are abortive, and sometimes they have merely so much of the rudiment of a germin, as is necessary to form a basis for the petal. It appears that some of the tubular florists, from circumstances are capable of becoming ligulate, which is analogous to the doubling, or change of the organs of impregnation into petals, in simple flowers. Witness the Chamomile. Another change happens in the *Chrysanthenum*, and *Tagetes* or African Marigold, whose ligulate florists become tubular, or, as the gardeners term it, quilled. Such quilled florists are abortive of course, being owing to preternatural luxuriance. Compound flowers entirely consisted of tubular florists, all prolife, occasionally assume matter or abortive ones in their margin, which are likewise tubular, but greatly dilated. This happens in some species of *Cardius* and *Serratula*, and according to the Linnaean system they thus become *Centesura*, for no system can provide against such anomalies. In like manner some species of *Bidens* acquire a ligulate radius, and constitute the genus *Cereoffs*. Hence have arisen many spurious genera of botanical authors. In the Order *Polygamiarum necessaria* of Linnaeus, the florists of the dish have flaments only, or at least a mere rudiment of a germin; those of the radius being furnished with perfect pillars without flaments. They thus are both necessary to the perfection of the seeds. Linnaeus, considering umbelliferous flowers as aggregate ones, uses the term *fleroderus* for what we prefix to *callflo*, or a simple flower. S.

**FLORID STYLE.** is that enriched and heightened with figures and flowers of rhetoric, in an exegetic degree; or, when the ornaments, applied to flyle, are too rich and gaudy in proportion to the subject; when they return upon us too fast, and strike us either with a dazzling light, or a false brilliancy. In a young composer this is very pardonable; perhaps, indeed, it is a promising symptom in young people, that their style should incline to the florid and luxuriant. *Volubile effetus in adolescentes frequentandus, etca.* says Quincentian; *i.e.* In youth, I wish to see luxuriance of fancy appear. Much of it will be diminished by years; much will be corrected by ripening judgment; some of it, by the mere practice of composition, will be worn away. Let there be only sufficient matter at first, that can bear some pruning and lopping off. At this time of life, let genius be bold and inventive, and pride itself in its efforts, though these should not, as yet, be correct. Luxuriance can be easily cured; but for barrenness there is no remedy.” But a similar apology cannot be pleaded for perfons of mature years, which is admitted for young composers in their first essays. Judgment, as it ripens, should chasten imagination, and reject, as juvenile, all such ornaments as are redundant, unfit for the subject, or not conducive to illustrate it. Nothing can be more contemptible than that tinsel splendour of language, which some writers perpetually affect. This cannot always be ascribed to the real overloading of a rich imagination. If this were the case, it might be in some measure excused; and we might accept amusement where we sought instruction.

But with these facile writers, it is a luxuriancy of words, not of fancy. We see a laboured attempt to rise to a splendour of composition, of which they have formed to themselves some loose idea: but having no strength of genius for attaining it, they endeavour to supply the defect by poetical words, by cold exclamation, by commonplace figures, and every thing that has the appearance of pomp and magnificence. It has eluded these writers, that artificery in ornament is one great secret for rendering it pleasing; and that, without a foundation of good sense and solid thought, the most florid style is but a childish imposition upon the public. The public, however, are too apt to be imposed on; at last, the mob of readers, who are very ready to be caught at first with whatever is dazzling and gaudy. Dr. Blair, after paying a deferred tribute of respect to the good qualities of Mr. Hervey, cloths to observing that the perpetual glitter of expression, the sickly imagery, and strained description, which abound in his writings, are ornaments of a base kind. “I would, therefore, advise fudents of oratory to imitate Mr. Hervey’s poesy rather than his style; and in all compositions of a serious kind to turn their attention, as Mr. Pope says, from flimsy to solid, from fancy to the heart.” Blair’s Lectures, left. 18.

Longinus uses the terms florid and affected style indifferently, and lays them down as quite contrary to the true sublime.

**FLORIDA**, in Geography, a country of North America, bounded on the North by Georgia, on the E. by the Atlantic, on the S. by the gulf of Mexico, and on the W. by the Mississippi. This country is said to have been discovered by Sebastian Cabot in the year 1496, 18 years before it was known to the Spaniards; but received its name from John Ponce, who, failing from Porto Rico in 1513, landed here in April, when the country appeared in full verdure and bloom. Florida has frequently changed its masters; in 1564 the French took possession of some part of it, but they were driven from their settlements in the following year by the Spaniards, who then began to form establishments for themselves. In the year 1763 Florida was ceded to Great Britain in exchange for the Havana, which had been taken from the Spaniards. Whilst the English were in possession of it they divided it into two governments, viz. East and West Florida, separated by the Appalachicola. During the American war, both the Floridas were reduced by the Spaniards, and guaranteed to the crown of Spain by the definitive treaty of 1783.

Although this country was of little utility to Great Britain, the possession of it would be valuable to the United States, more especially since they have obtained the province of Louisiana. On the part of Spain, the cession of it would be politic, as it might force to divert the attention of the States from the riches of the west, and as a means of unity. Well Florida in particular, is chiefly useful as presenting avenues of commerce. East Florida extends much farther south than West Florida; the gulf of Mexico washing the western coast from N. lat. 5 to 30°, whereas the most southern part of West Florida is in N. lat. 29° 30′. The form of East Florida is triangular, the base towards the N. being 162 miles in breadth from E. to W. near the southern extremity about 40, and about 350 from N. to S. Along the coasts the bays of small islands are numerous. The soil near the sea-coast is sandy and barren; but further inland it improves. The productions are chiefly rice and indigo. West Florida is about 320 miles from E. to W., and from 40 to 80 in width from N. to S.; on the W. it is bounded by the river Mississippi.
The country is pleasant, and the soil is exceedingly fertile, so that the inhabitants have sometimes two or three harvests of maize in the same year. Towards the coast it is flat, but rises gradually into hills, which are covered with verdure and large trees, such as white and red oak, crab oak, mulberry, magnolia, pine, hickory, cypress, red and white cedar, &c. Orange and lemon trees grow here without cultivation, and produce better fruit than in Spain and Portugal. They have also vines, which yield grapes equal in size and flavour to the best muscadine; and they have abundance of other fruits of excellent flavour. The cabbage tree furnishes a food that is pleasant and wholesome. Cotton is produced in great plenty; as well as flax and hemp. Among the richer productions of the country we may reckon conchineal and indigo. The coasts furnish oysters and amber. The rivers abound in fish, but are meekled by alligators. In the western parts are numerous herds of cattle and flocks of sheep: hogs also, whose flesh acquires an excellent flavour from the acorns and chestnuts on which they feed, are numerous. In the forests and deserts are found several species of wild beasts, and also a variety of birds. In summer the air is very hot, but in several places it is pure and wholesome; the winter is commonly temperate, though the cold sometimes destroys the orange trees. The rivers are covered with ice. The principal town in W. Florida is Pensacola, and in E. Florida St. Augustine. The population of W. Florida is very considerable; Mobile and Pensacola together not containing above 1500 souls. The interior of E. Florida is little known, and only inhabited by a few Creeks or Seminoles. The town of St. Augustine in E. Florida is less healthy than some have supposed it to be; but the climate, and also the general appearance of the country, would be much improved, if industry and labour were bellowed upon it, and the inland marshes were properly drained.

Florida, a port-town of America, in Orange county, New York; 50 miles N.W. of New York city. Alto, a town of Montgomery county, New York, on the S. side of Mohawk river, at the mouth of Schoharie creek. It has 1218 inhabitants.

Florida, Læ, one of the Solomon islands, in the Pacific ocean, discovered by Mendana, in 1557. S. lat. 9° 30'.

Florida, Cape, the most southerly point of land of Joel Florida. X. lat. 25° 24'. W. long. 81° 50'.

Florida, Gulf of, or Bahama straits, the narrow channel that separates the peninsula of Florida from the Bahama islands.

Florida Stream, or Gulf stream, a channel which separates the island of Cuba from the coast of Florida, between the gulf of Florida and the gulf of Mexico.

Florilegium, Florilegis, a name the Latins have given to what the Greeks called anthologia, anthology; viz. a collection of choice pieces, containing the most and brightest thoughts in their kind.

Florilegis, is also particularly used as a kind of breviary, in the Eastern church, compiled by Arcadius, for the convenience of the Greek priests and monks, who cannot carry with them, in their travels and pilgrimages, all the volumes wherein their office is dispersed.

The Florilegium contains the general rubries, psalter, can- tileus, the horologium, and the office of the ferie, &c.

Florin, sometimes used for a coin, or real money; and sometimes for any imaginary money, or money of account.

Florin, as a coin, is of different values, according to the different metals, and different countries where it is struck. Pieces under this denomination were anciently very frequent in commerce; at present they are less common, though there were abundance of them struck in Holland, of English silver, during the war, which was terminated by the treaty of Rywick. In all appearance they took their name from the place where they were first struck, viz. the city of Florence. The era is about the year 1251; though others ascribe the name to a flower de lisle, which was struck on one side.

Villani observes, that there were gold florins in the year 1067, from which time the names frank or florin became applicable to the gold coins, which till that time had been called solidi, siliings. See Coin and Exchange.

Florin, as a money of account, is used by the Italian, Dutch, and German merchants and bankers, in keeping their books, and making up their accounts. But this florin is very various, and admits of different divisions. See Coin and Exchange.

Florin, or Florentine, was also a gold coin, struck in England in the eighteenth year of Edward III. of the value of six shillings. Camden says, it was so called, because made by Florence. Fabian observes, the florins were not of so fine gold as the nobles and half-nobles of that prince.

But what is most observable is, that Fabian calls the florin a penny, value 6s. 8d. the half-florin, a halfpenny, value 3s. ad. the quarter-florin, a farthing, value 1s. 4d. These words were often met with in old histories and accounts, applied to several coins, as roials, angels, &c. Where we are therefore only to understand by penny or denarius the whole, by ob. tus the half, and by quadrans the fourth part, or farthing.

By indulgence of the mint, in 18 Edw. III. every pound weight of old standard gold was to be coined into fifty florins or florins, to be current at six shillings a-piece; all which made in tale fifteen pounds; or into a proportionable number of half and quarter florins.

Florin, in Geography, a town of the island of Sardinia, eight miles S. E. of Saffani.

Floriniani, or Florianini, in Ecclesiastical History, a sect of heretics, of the second century, denominated from its author Florinius, or Florinianus, a priest of the Roman church, deposed along with Blasius, for his errors.

Florinians had been a disciple of St. Polycarp, along with Irenæus. The made God the author of evil; or rather affected, that things forbidden by God are not evil, but of his own appointing. In which he followed the errors of Irenæus, and joined himself with the Carpoctarians. He seems to have maintained the doctrine of two principles, with other Gnostic errors.

They had also other names given them. Philastrius says, they were the same with the Carpoctarians. He adds, that they were also called soldiers, militiae, quia de multibus iacens. St. Irenæus calls them Gnostics; St. Epiphanius, Phibionites; and Theodoret, Barborites, on account of the impurities of their lives. Others call them Zaccæans; others Caddians, &c. though for what particular reason it is not easy to say, nor perhaps would it be worth while to enquire.

Floris, Francis, in Biography, a painter of history, born at Antwerp in 1520. Having practised the art of sculpture till he was 20 years of age, he then indulged his partiality for painting, and changing his profession, studied the latter under the tuition of Lambert Lombard. He
afterwards went to Rome, there copying the works of the ancients; but he appears to have felt with more fervour the works of Michael Angelo Buonaroti; which he imitated with great zeal, particularly his Last Judgment; unhappily, however, attending more to the parts than the whole.

The tale which he imbibed by these studies not a little surprised his countrymen on his return to his native city; and it acquired for him the honourable appellation of the "Raphael of Flanders," though not very justly, for his style of design is more in imitation of M. Angelo than of Raphael.

He painted for the Confraternity Hall of St. Michael at Antwerp a large picture, which now graces the walls of the Louvre at Paris. The subject is "The Fall of Lucifer and his Angels." It is highly celebrated for the grandeur and symmetry of the composition and handling, for the variety of attitudes in the fallen angels, and for the strong expression of the muscles in the naked figures. In fact it is a very curious picture, painted with great capacity, and exhibits a powerful, though eccentric, imagination. The scenes in M. Angelo's Last Judgment are not more horrible, or nearly so grotesque. The power of colour also is admirable, and in some parts has been rarely surpassed.

He had a strong and bold manner, and, like his great model Buonaroti, marked the muscular parts too fully for a just imitation of nature. He invented and composed with ease, but in a dry and gothic manner; and though sometimes his figures have an agreeable air, yet in general they possess a reprehensible degree of the flabby and formality peculiar to the age and country he lived in. He died in 1575, aged 50.

FLOREONIST, in Gardening, a name applied to such persons as are curious in, or have much skill in the knowledge and nature of flowers. A good florist should be perfectly acquainted with the names, characters, and kinds, or sorts of flowers; and at the same time have a thorough knowledge of their nature, habits, and methods of cultivation and management.

FLOREUS, J. ANNAUS, in Biography, a Latin historian, who wrote about 250 years after the reign of Augustus. This is his own country, from which he was else-where, viz. that he lived under Trajan; it has been conjectured that his history was written about 150 years after Augustus. His work is "A Compendium of the Roman History," from the foundation of the city to the reign of the emperor Augustus, in four books. It is to be regarded rather as a Panegyric on many of the great actions of the Romans, than a faithful and correct recital of their history. Throughout the narrative there are, unquestionably, pleasing reflections which display great animation, and strong powers of sensibility. It has obtained a sufficient share of popularity to be recommended very generally as a proper book for the learners of the Latin language; and it has employed the attention of several critical authors. Flores was a writer of poetry as well as an historian, and has been thought to have entered the lists against the emperor Adrian. The best editions are, that by Duker, in 2 vols. 8vo. Lug. Bat. 1722; 1714; the Dolphin edition; and that of Gravelot, Rome, Heli. Lempresdr.

FLORES, DEEPANUK, who was famined "the Master," a deacon of the church of Lyons, born in the ninth century. He obtained so high a reputation for learning and asceticism, that he was chosen by the church of Lyons to answer the treatise of John Scotus Erigena, on the subject of predetermination. This was published in the year 852, and entitled "Libri de predeterminatione, contra Johannis Scoti errores definitiones." It is to be found in the

8th vol. of the "Bibliotheca Patrum." It is not ascertained how long the author lived after the production of this work. Flores was the author of "Commentarius in omnes S. Pauli Epistles," which has been lately assigned to the venerable Bede, and admitted into the collection of his works, and several other theological pieces. Moretti.

FLOREUS, in Ornithology, a name by which Aldroand and some other authors have called the bird commonly known with us by the name of whinchat, a kind of the Passerine or今后 such. See Muscicapa Rubra. See also LOXIA Chloris.

FLOREY, FLOWERY, FLOWERS, FLORETTI, Fleur-de-lis, &c. terms in Heraldry, used when the outlines of any ordinary are drawn as if trimmed with, or in the form of flowers, lilies, fleur-de-lis, &c. Thus, he bears a cross flory, &c.

FLOS, in Botany. See Flower.

FLOS AERIS. See Fert.*

FLOS AMBREUALT, in Botany, a name given by some to the polygala or milkwort. See POLYGALA.

FLOS ARGENTI. See FLORES ARGENTI.

FLOS AFRIC. in Natural History, a name given by Swenfeld and some other writers, to that falt which is found on the surface of the earth in some part of Africa, in form of an efflorescence, and is called the Smyrna soap earth.

This falt is evidently the same with the nitre of the ancients. It will ferment with any acid in the manner of our potash, or other fixed farts, made by fire: and with oil or any fatty substance, boils into a soap. Endius gives us a great many different places for its production, from which it is distinguished it is several kinds; all these lie in the eastern parts of the world; but to these Wormius adds, that it is found in New Spain. It is always easy to be known, however, in whatsoever place it is found, being a native alkali falt, perforated like a sponge, and of a lixivial taste. Its principles seem to be a marine and a urinous falt.

That it contains a marine falt seems manifest from this, that it has the same taste in solution, or nearly so, with marine falt; that the particles of it, when coagulating in the evaporated water in which they were dissolved, first rise to the top of the surface, as those of common falt do, and that it is always of a foamy texture, or full of holes, which is always the case with those things in which the common falt makes a part, its natural concretions being hollow pyramids. Its containing an urinous falt is plain, from its producing with salt of tartrate the same sort of spirit that is soluble when mixed with that fixed falt.

FLOS CALL, the flower of th. horizon, a name given by the alchemists to the holoth, which often appearing after rain, was supposed to fall from heaven. See FLOS TERRA.

FLOS MARTINII. See FLORES MARTINII, AND IRON.

FLOS SALL. The flower of salt, flows down with the Nile, and is also found on the surface of some lakes. It is to be chosen of the colour of saffron, somewhat of a rank, small like garlic, of a biting taste, and of a fettish substance. What is coloured with mustard, or is grumus, is to be rejected. Before, what is pure and genuine is not to be dissolved but in oil; whereas what is adulterated is partly dissoluble in water.

It is efficacq against malignant and phlegmatic ulcers, nausea in the pudenca, and purulencies in the ears; it also cures dimness of sight, and removes specks and albugo from the eyes. It is mixed with plasters and ointments, as also with oil of roses, for the sake of the colour it communicates to them. Taken inwardly, in wine or water, it provokes sweat, disturbs the belly, and incommodates the flomash. It is also an ingredient in acopa and fermenta, for extenuating the hair. In general, it is of an astringent nature.
FLO

rious and pyritic quality, as are all falks themselves. Dioscor. lib. v. cap. 170.

Floetl Terre, flower of the earth, a name given by some of the chemical authors to the nothof, a remarkable plant, which resembles the common green easter-weed, but that it is thicker and more like a jelly. It suddenly appears on gravel walks and gardens after rain; and the alchemists, who knew not what to think of its origin, supposed it to contain an universal spirit, capable of turning metals into gold. See Northco.

Flotis Timopus. In Botany, a name given by Thoreto, and many others, to the gentianula victrix, or dryer's-weed, called also lutes herba, and latum by the Latins, and al-semenium, cymene, and thalpoc, by the Greeks. See Genista.


Gen. Ch. Cal. Perianth inferior, funnel-shaped, hairy, coloured, permanent; its border in three ovate, curved, spreading segments. Petals three, ovate, crec, as long as the segments of the calyx. Stam. Filaments five, sub-cylindrical, longer than the corolla; anthers roundish, with two lobes. Fil. Germen superior, ovate, compressed, two-lobed; style awl-shaped, flexsed, longer than the stamens; stigma rather thick. Peric. Capsule nearly ovate, two-lobed, two-celled. Seeds solitary, ovate, compressed, borne, with many concrescent radiating furrows.


1. F. flabellata. Deci hoa choi of the Cochii-chinese. Native of hills in Cochii-china. Stem flosely, climbing, without tendrils or spines, unbranched, long, round. Leaves alternate, lanceolate, entire, heath-like, many-sundered; fringed at the base; rough on the upper side; smooth beneath. Flowers small, pale violet, on very short partial flasks, in cleacter, rigid, clustered, level topped spikes resembling a bower. Lourieoa.

By the above description of Lourieoa, this plant is evidently very nearly akin to Tradescantia and Commulata, but its simple filaments, and two-celled capsule, seem to authorize its being kept distinct. We have from Sierr Leon a plant which, in the character last-mentioned and the influence, how far else we cannot say, agrees with it, and is surely of the same genus, if not the very identical species.

It seems to us that Tradescantia paniculata. Roxb. Corom. v. 3. 6. t. 109, must be the same genus, if not the very same species, as the above. The simple filaments evidently show it not to be a Tradescantia, which the influence confirms. Perhaps Flosca is not generally different from the Calystiga of Jacquin and Linnæus. See Calystiga.

Flosculus, a term used by Mr. Tonnerton, and others, to express such flowers of plants, as are composed each of a great number of other small flowers placed close to one another, and inclosed in the same common cup; each of these smaller flowers consists of one petal, which is slender and hollow, and wider than the bottom, and usually divided into many segments, which sometimes are disposed in the form of a star. Each of these flowers stand upon an embryo, or young fruit, from which there grows a capillament, which reaches beyond the flowers. These embryos are lodged in the bottom of the cup, which is called by authors the thalamus of the flower, and finally become seeds winged with down, or sometimes without that, and sometimes are armed with prickles. Of this sort are the flowers of thistles, knapweed, &c.

Flosculus. See Floret.

Floess, in Geography, a town of Bavaria; five miles N. E. of Weiden. — Alt, a river of Sicilia, which runs into the Oder, six miles N.W. of Breslau. See Flois. Horn, a cape on the N. coast of Iceland. Nat. lat. 66 6.

Floila, a small western island of Scotland, near the N. coast of Lewis. — Alt, one of the small Orkney islands, between South Ronalds and Hoy. Nat. lat. 53° 25' W. long. 21° 59'. — Alt, one of the smaller Hebrides, on the S. E. coast of North Uist. Nat. lat. 57° 28'. W. long. 7° 8.

Flocta, or Flotta, Floto; a name the Spaniards give particularly to the ships which they send annually from Cadiz, to the port of Vera Cruz, to fetch thence the merchandizes gathered in Mexico for Spain. It consists of the captains, admiral, and patach, or pinnahe, which go on the king's account; and about sixteen ships, from four hundred to a thousand tons, belonging to particular persons. They set out from Cadiz, about the month of August, and are eighteen or twenty months before they return.

These few to fetch the commodities prepared in Peru, are called galesons. See Galeon.

The name flotta is given to a number of ships, which get before the rest in their return, and give information of the departure and cargo of the flota and galeons. See Flota.

Flotanges, all such things as are floating on the top of the sea, or great rivers, a word chiefly used in the commissions of water-bailiffs.

Flote-Fascie Grai, a kind of natural grass which is found in watery situations, and said to be an excellent cattle grass, affording much fodder. See Festa.

Flosson, Flotsam, or Flotus, a term signifying any goods lost by shipwreck, and swimming on the top of the water; which, with jelsam or jelsam, and lagun or ligon, and share, belong to the king, if no owner appears to claim them; but if any owner appears, he is entitled to recover the possession. For even if they be cast overboard, without any mark or buoy, in order to lighten the ship, the owner is not by this act of necessity construed to have renounced his property (Lind. 2. 1. § 48); much less can things ligon be supposed to be abandoned, since the owner has done all in his power to avert and regain his property. Things jelsam, folaum, and lagun, are accounted as far distinguished from wreck (which fees) by the king's grant to a man of wrecks, the others will not pass. Over those the admiralcy courts have jurisdiction, as they are in and upon the sea. (5 Rep. 138.)

Jelsam is what is called out of a ship, being in danger of a wreck, into the sea, and there sink and remain under water. Lagun or ligon, is that which lies in the bottom of the sea; but tied to a cork or buoy, in order to be found again (5 Rep. 136.) Share, are goods due to several persons by proportion. See Floisse. L. E., in Geography, a town of France, on the N. coast of the island of Re.

Flotz, a town of Germany, in the principality of Anhalt Zerbit; six miles N.W. of Zerbit.

Flander, in Ichthyology, the English name of the fish called by the generality of authors (a) pemur, and (c) fust. It is a species of the Pleuronectes, which fees. The flounder inhabits every part of the British sea, and even frequents our rivers at a great distance from the salt-waters. It never grows large in our rivers, but is reckoned sweeter than those that live in the sea. FLOIS

2
FLOUR, the meal of any grain, but more particularly of wheat, ground and sifted for the purpose of food.

The grain itself is not only subject to be eaten by insects in that state, but when ground into flour, it gives birth to another race of destroyers, who eat it unmercifully and increase so fast in it, that it is not long before they wholly destroy the substance. The finest flour is most liable to breed them, especially when stale or ill prepared; in this case, if it be examined in a good light, it will be perceived to be in a continual motion; and on a nearer inspection, there will be found in it a great number of little animals of the colour of the flour, and very nimble. If a little of this flour be laid on the plate of the double microscope, the insects are very distinctly seen in great numbers, very brisk and lively, continually crawling over one another's backs, and playing a thousand antics tricks together; whether for diversion or search of food, it is not easy to be determined. These animals are of an oblong slender form, their heads are furnished with a kind of trunk, or oblong hollow tube, by means of which they take in their food, and their body is composed of several rings. They do visit mitchell among the magazines of flour, laid up for armies and other public uses; when they have once taken possession of a parcel of this valuable commodity, it is impossible to drive them out, and they increase so fast, that the only method of preventing the total loss of the parcel, is to make it up into bread as soon as can be. The way to prevent their breeding in the flour is to preserve it from damp; nothing gets more injury by being put up damp than flour, and yet nothing is so often put up so. It should be always carefully and thoroughly dried before it is put up, and the barrels also dried into which it is to be put; then if they are kept in a room tolerably warm and dry, they will prefer it well. Too dry a place never does any hurt, though one too moist always spoils it. See Meal.

FLOUR, St. in Geography, a town of France, in the department of the Cantal; before the revolution, the capital of Upper Auvergne and the see of a bishop; containing in its north and south divisions 5000 inhabitants; in the canton of the former 10,538, and in that of the latter 15,121, on a territory of 585 kilometres, in 27 communes. The inhabitants carry on a considerable trade in corn, with manufactures of cloth, carpets, and cutlery. N. lat. 45° 2'. E. long. 3° 10'.

FLOWER, in Physiological and Systematical Botany, comprehends all those organs of a plant which are preparatory and necessary to the impregnation and perfection of the fruit or seed. (See Fecundation and Fructification.) Of the seven parts of fructification distinguished by Linnaeus, five constitute the flower. These are, first, the calyx or flower-cup; second, the corolla or petals; neither of these is indifferenciable, one, and sometimes both of them being occasionally wanting; (see Calyx and Corolla) third, the stamen or stamens, generally filamentous bodies, ranged internally with respect to the two former; these are essential, being the male organs; fourth, the pistil or pistils, in the centre of the flower, which consist of the rudiments of the fruit, and the female organs of impregnation, being therefore essential, though not always situated in the same individual flower, nor even on the same plant, with the stamens; fifth, the receptacle, or common point of connection, which must be present in some shape or other, and in compound flowers is very important; see Compound.

Flowers are usually the most ornamental part of vegetables, but the most fleeting and transitory. After their production, the vegetation of the plant, however rapid and luxuriant before, is checked, at least for a time, even in perennial plants and trees; and annual ones survive flowering only till they can ripen their seed. The same flower, which will endure for several winters without blossoming after this event loses its vigour, and yields to the first attacks of frost. Pliny observes that "blooms are the joy of trees, in bearing which they assume a new aspect, veiling with each other in the luxuriance and variety of their colours." Linnaeus has adopted and exemplified this idea, to concur with his own theory of vegetable propagation, and with the importance which he gives the flower in his principles of classification, as the sure guide to a true differentiation of the kinds of vegetables. The various modes in which flowers are situate upon, or connected with, the plant that bears them, will be explained under the article of Inflorescence, an important subject in systematic botany. In position they greatly differ in different genera or species. Most generally they expand, and present themselves to the light, in a remarkable manner, either drooping when its stimulus is withdrawn; but some flowers always droop, hiding their internal organs, and protecting them from rain, as long as their own delicate filament endures. Flowers are eminently distinguished from the other parts of a plant by their general beauty and vivacity of colour, chiefly seated in the corolla, and likewise, in many instances, by their peculiar fragrance, the theme of poets and the admiration of all whose nerves, which is not always the case, can endure it. This fragrance is proved by experiment to depend on a volatile, essential oil, in many cafes obtainable by distillation, in others by infusion in spirits, or in expelling oil, either of which imbibe or diffuse it. Flowers do not give it out alike at all times; some have no scent during the day, but become highly fragrant in the evening. These enhance the luxury of the bright moonlight nights of India, nor is our own country deficient of many such flowers. They are elegantly termed by Linnaeus fœces trites, sad or melancholy flowers. Their colour is very frequently pale and sickly, inclining to greenish or brownish yellow, agreeing remarkably in plants of very different classes and characters, which moreover have usually the same fame luminous evening scent. Among these are Hydrilia tælæ, Pelargonium tritile, M.femoranthemum noviflorum, Nyctanthes Arbor-tritile, and others. Many oriental flowers have a fine lemon-like odour in an evening, which are, for that reason, affably cultivated by the Chinese; as the Chloranthus incopiscus, whose merit in this respect was not discovered in England till it had long been cultivated, nor was the sweet and powerful scent, obserable on first opening the hot-house in a morning, suspected to proceed from so minute and inconsiderable a blossom, till the late Mr. Aiton of Kew, whom no natural phenomenon could escape, first made the discovery. There seems to be an analogy between the smell and colour of flowers in other instances. The yellow variety of Chrysanthemum indicum differs altogether in scent from the dark-purple one, agreeing rather with the yellow wall-flower, which it also resembles in colour. The deep crimson Carnation, called the Clove Carnation, and the Clove Pink now nearly extinct, have a clove-like fragrance, richer than the paler or whiter kinds.

Ever since Botany has been cultivated on scientific principles, the flower and fruit have unceasingly been referred to for the leading distinctive characters of plants. (See Classification.) On these conjointly all natural characters of Genera, Orders and Classes are founded. The heritage of the plant is, according to the Linnean idea, a sort of mark, which conceals its true characters till they become manifest in the flower. Artificial systems of arrangement
ment have been contrived by some authors on the fruit, by others on the flower. The former are usually considered as most according with natural affinities, the latter as the most convenient. The principal of these last are those of Rivinus and Tournefort, in which the corolla takes the lead; and the sexual sytem of Linnæus, founded chiefly on the lames and pellils.

The medical properties and sensible qualities of flowers, their peculiar odours excepted, agree much more with the herbage, than with the fruit to which they are intimately attached. Thus in the class *Icaflandria*, as far as least as that class is a natural one, the flowers, as in the peach and cherry for instance, partake of the acrid, noxious, effiential, oil of the leaves and bark, not at all of the sweet, acid, or aromatic qualities of the pulpy fruits. S.

**Flowers, Colours of.** It has been affected by some chemists, that all colours arise from sulphurs, and that they differ according to the different admixtures of salts with these sulphurs. Perhaps on these principles, it may be possible to form some rational conjectures in regard to the origin of colours in the flowers of plants. We know very well that the flowers of all plants abound in an effiential oil or sulphur, to which, according to this doctrine, their colours may be rationally ascribed to be owing; and though this oil should be proved to be of the same or similar substances in all, yet their variety of colours may be accounted for in part, since we find that one and the same oil, the effiential oil of thyme, according to Mr. Geoffroy’s experiments, may be turned to all the colours that we find in the different flowers of plants, from white to deep black, with all the shades of red, yellow, purple, blue, and green, by mixing it with different fluids; and by the same laws, the effiential oil of plants, when mixed in their flowers, may by the different mixtures they meet with, give them all their beautiful variety of colours. See *Effiential Oils*.

We know that the infusions of flowers, and of other parts of plants, become red on being mixed with acids, and green on being mixed with alkalies; and there is no reason to doubt, that it is the sulphureous part of the vegetable in these infusions which thus changes colours on these mixtures. This, however, ought to be proved possible, before it is allowed in argument.

*This proof is given in the change of colours before mentioned, which are produced in oils merely by the admixture of different fluids; and as all the colours in these are the regular result of certain combinations, there is great reason to believe, that in those plants whose flowers give the same colours, there may be the same combinations.*

The principal colours of plants, and their several parts, are green, yellow, red, purple, blue, white, black, and transparent whiteness; all the others are produced by different combinations of these. The green, which is the common colour of the leaves of plants, is probably the effect of an oil rarefied in that part of the plant, and there mixed with the fixed and volatile fluids of the sap, which remain entangled by the earthy particles after most of the aqueous humidity is evaporated, and by that means become in a state to act upon the oil. A clear proof of this is, that if the leaves are covered up in such a manner that the aqueous humidity of the sap cannot evaporate itself, the oil and fluids cannot act upon one another as they naturally would, but becoming diffused among to be of great a quantity of water, lose the colour they would otherwise have obtained together, and become whitish or transparent. This is seen in the obvious influence of succory and celery, the leaves of both which plants, though naturally green, become white by being covered up with earth by the gardeners.

The leaves of both plants and trees usually turn red in autumn, or on the attack of the first frost; the reason of which is, that the several canals of the sap being constricted by the cold, the juices are detained in the vessels of the leaves, or at least its circulation is greatly interrupted; and being detained there, it naturally grows four, the acidity of this altered juice destroying the green colour, produced by the alkaline fluids. The sap brings on a red colour, in the very same manner that the effiential oil made green by a mixture of oil of tartar is again changed to red, by adding to it a proper quantity of distilled vinegar. Where we find in our common experiments the acids of the mineral kingdom turning the infusions of flowers red, it seems by the analogy of these experiments to be only owing to their destroying the blue, brown, or other colour, which the alkaline fluids of the plant had made with its effiential oil.

All the shades and degrees of yellow and saffron colour in the flowers of plants, seem wholly owing to a mixture of an acid in their juis, with their effiential oil; as the oil of the apricot, which itself has very little colour, is made to pass through all these shades of colours, only by digesting it with distilled vinegar. From the digesting the volatile alkalies, such as spirit of sal ammoniac and urine, with the same oil, it appears that all the shades of red, from the pale flesh-colour, to purple, and even to the violet blue, are only owing to the different admixtures of an alkaline volatile fluid of the urinous kind, mixed in different manners with their effiential oil.

Black, which is a very uncommon colour in flowers, and which in them ought to be regarded only as a very deep violet, seems the effect of an addition of an acid juice to their oil, already turning purple to violet colour by a volatile alkali.

All the shades of blue and purple seem also, by the analogy of the same experiments, to be only the effects of mixtures of alkalies of the fixed and volatile kind, with the oils of plants; since these colours are all produced in these experiments, by mixing the spirit of sal ammoniac, and the oil of tartar with oil of flowers.

This bright green of some flowers seems also to be produced by the same fats, only acting on oils more rarefied. For the oil of thyme of a purple violet-colour diluted with rectified spirit of wine, being diluted with oil of tartar, becomes green. Mem. Acad. Par. 1707.

Bocccone is of opinion, that in many plants the colour of the flowers is wholly owing to the colour of the juices of the root. This he infers in the greater celandine, whose roots and flowers are of the same yellow colour. The barberry in like manner, he observes, has both its roots and flowers yellow. The gentian has its roots and flowers both of a pale red, and the acacia indica Aldini, and many other plants, he says, are infusions of this. The reason that he assigns for this is, that the more fixed parts, wherein this colour confines, preserve the same tincture, without being altered by so long a circulation as that from the root to the flower; and he adds another very remarkable observation, which is, that in these plants and trees, whose roots and flowers are of the same colour, the juices are more fixed; and therefore, that these are more fit for dyeing than any other coloured wood of plants. Vide Bocccone, Muf. de Plant.

Dr. Lewis, in his notes on Neumann’s Chemistly, has many curious observations on the colours of flowers.

There
There are few of them which are durable in themselves, or that can be made durable by art. The only permanent colour is yellow. The red, the blue, and the intermediate shades of purple, crimson, violet, &c. are very perishable. Many flowers lose their colours on being dried, and especially if they are dried in a shady and not warm place. The colours of all of them perish by keeping even in the closest vessels; the more badly they are dried, and the more perfectly they are secured from air, the more the longer do they retain their beauty. The colouring matter of flowers extracted and applied to other bodies is still more perishable.

The colour of many blue flowers is extracted by infusion in water; but from others, water acquires only a purplish blue. Of those which have been tried, not one gives a blue colour to spirit of wine; some give no colour, and some give a reddish colour. The expressed juice of these flowers is generally blue. The blue juices and infusions are rendered red by acids; and the most florid red is given to them by marine acids. The flowers also, by maceration, impart a red colour to acid liquors. Alkalies fixed and volatile, and lime-water, change these blue colours to green. And those infusions or juices which have nothing of the colour of the flower, suffer the same changes from the addition of acid and alkaline liquors. Even when the flowers have been kept till their colours are lost, their infusions acquire a red colour from acids, and a green colour from alkalies, but in a less degree than when the flowers were fresh. The red colour produced by acids is scarcely more durable than the original blue; applied upon other bodies, and exposed to air, it gradually degenerates into a faint purple, and at last disappears, without leaving a stain behind. The green produced by alkalies changes to a yellow, which does not fade so fast. The green made by lime-water is more permanent and beautiful. Green lakes, prepared from blue flowers by means of lime-water, have been used by painters. The flowers of cypress have been much commended for affording elegant and blue pigments. But Dr. Lewis has not been able to extract from them any blue colour. They retain their colour, when badly dried, longer than other blue flowers, but do not communicate their original colour to any menstruum.

Red flowers readily communicate their colour to water; and those of a full red colour give to a rectified spirit also a deep red tincture, brighter, though somewhat paler, than the watery infusion. But the light red flowers, and those which are purplish, impart little colour to pure spirit. The colours of infusions of these flowers are lifted to be heightened by acids, and to be rendered green by alkalies. But this is not universal. For amongst those examined by Dr. Lewis, the red colours and purplish red were changed by acids nearly as blue flowers are; but the full deep reds were not. The deep infusion of red poppies was turned by alkalies not to a green, but to a dusky purple.

Yellow flowers communicate to water and to spirit of wine durable yellow colours, not alterable but in degree by acids or by alkalies; the former only rendering them paler; and the latter, as also alum, rendering them deeper. 'Wool, or silk,' impregnated with a solution of alum or tartar, receives, on being boiled with the watery infusion or decoction, a durable yellow dye. A durable yellow lake is prepared by precipitating with alum an infusion of yellow flowers made in an alkaline ley. In some of the orange-coloured flowers the yellow matter seems to be of the same kind as that of the pure yellow flowers; but the red matter seems to be different from that of the pure red flowers. The yellow matter is extracted from these flowers by water; and the remaining red matter is extracted by spirit of wine, or by a weak solution of fixed alkali in water. Such are the saffron coloured flowers of carthamus. These flowers, after the yellow matter has been extracted by water, are laid to give a red tincture to ley, from which a deep red, or scarlet, called safflower, Spanish red, and Chinslike. This pigment gives a beautiful red colour to spirit of wine, but none to water. The yellow farrina or fine dust, resting on the tips of the stamens of flowers, gives a fine bright yellow colour to spirit of wine, and a darker yellow colour to water. The colours of both the watery and spirituous tinctures were heightened by alkalies, rendered red by acids, and again restored to a yellow by adding an alkali. This is the only known instance of the yellow colour of a vegetable being rendered red by acids. White flowers, or their expressed juices, impart a green colour to alkaline leys, but have not been observed by Dr. Lewis to give a red colour to acids. The white flowers of the common wild convolvulus give a deep yellow or orange colour to water, which is affected by acids, by alkalies, and by alum, as the infusions of yellow flowers are. The white flowers of xeranthemum give a beautiful yellow colour to water acidulated with spirit of nitre. See Neumann's Chem. by Dr. Lewis, p. 430, 432.

Flowers, in Gardening, are distinguished into early, or spring-flowers, which flourish in the months of March, April, and May. Of this class are the anemones, daffodils, hyacinths, tulips, jonquils, cowslips, primroses, &c. Summer-flowers, which open in June, July, and August, as pink, gilly-flowers, lilacs, daisies, campanulas, poppies, sun-flowers, &c. Autumnal, or late flowers, denote those of September and October; as the chrysanthemum, Indian pink and roses, pansy, flower-gentle, &c. Of these flowers, those which subside all the year, we mean in the stem, or root at least, are called perennials. And those which are to be planted or sown afresh every year, according to the season, are called annual.

Flowers, Preservation of: The method of preserving flowers in their beauty through the whole year has been diligently sought after by many people; some have attempted it, by gathering them when dry, and not too much opened, and burying them in dry sand; but this, though it preserves their figure well, yet takes off from the liveliness of their colour.

The primrose and cowslip kind are very eminent instances of the change of colours in the flowers of dried specimens; for those of this class of plants easily dry in their natural shape, but they not only lose their yellow, which might be expected naturally enough, but they acquire a fine deep green, much superior to that of the leaves in their most perfect state. The flowers of all the violet kind lose their noble blue, and become of a dead white, so that in dried specimens there is no difference between the blue-flowered violet and the white-flowered kinds.

Muntingius gives a method, which he says is preferable to all others; this is as follows: gather roses or other flowers when they are not yet thoroughly open, in the middle of a dry day; put them into a good earthen vessel, glazed within; till the vessel up to the top with them; and when full, sprinkle them over with some good French wine, with a little salt in it; then set them by in a cellar, tying the mouth of the pot carefully down. After this, they may be taken out at pleasure, and on setting them in the sun, or within the reach of the fire, they will open as
FLOWER.

if on the tree, and not only the colour, but the smell, will be preferred.

Sir Robert Southwell has communicated to the world a method of drying plants, by which all flowers are preferred in their natural shape, and many in their proper colours. To this purpose two plates of iron are to be prepared to the size of a large half sheet of paper, or larger for particular occasions; there plates must be made so thick as not to have any power of bending, and there must be a hole made near every corner for the receiving a screw to fasten them close together.

When these plates are prepared, lay in readiness several sheets of paper, and then gather the plants with their flowers, when they are quite perfect; let this always be done in the middle of a dry day, and then lay the plant and its flower on one of the sheets of paper doubled in half, spreading out all the leaves and petals as nicely as can be. If the flalk be thick, it must be pared or cut in half so that it may lie flat; and if it be woody, it may be peeled, and only the bark left; when the plant is thus expanded, lay round about it some loose leaves and petals of the flowers, which may serve to complete any part that may prove deficient; when all is thus prepared, lay several sheets of paper over the plant, and as many under it; then put the whole into the iron plates, laying the papers smoothly on one, and laying the others over them; then sew them close, and put them into an oven after the bread is drawn, and let them lie there two hours; after this make a mixture of equal parts of aquafortis and common brandy; make these well together, and when the flowers are taken out of the pressure of the plates, rub them lightly over with a camel's hair pencil dipped in this liquor; then lay them upon fresh brown paper, and covering them with some other sheets, press them between this and other papers with a handkerchief, till the wet of these liquors is dried wholly away. When the plant is thus far prepared, take the quantity of a num-ber of gum dragon, put this into a pint of fair water cold, and let it stand four and twenty hours; it will in this time be wholly dissolved; then dip a fine hair pencil in this liquor, and with it rub over the backside of the leaves, and lay them carefully down on a half sheet of white paper fairly expanded, and press them with some more papers over these. When the gum-water is fixed, let the press and papers be removed, and the whole work be finished. The leaves retain their verdure in this cafe, and the flowers usually keep their natural colours. Some care must be taken, that the heat of the oven be not too great. When the flowers are thick and bulky, some art may be used to pare off the backs, and dip-pose the petals in a due order; and after this, if any of them are wanting, their places may be tamped with some of the supernumerary ones dried on purpose; and if any one of them be only faded, it will be prudent to take them away, and lay down others in their stead: the leaves may be also dipposed and mended in the same man-ner. Another way of keeping both flowers and fruit the whole year without spoiling, is delivered by the fame au-thor in the following manner: take salt-petre, one pound; balsam, a pound; clean common sand, three pounds; mix all well together, then gather fruit of any kind, that is not fully ripe, with the stalk to each; put them in one by one into a wide-mouthed glafs, laying them in good order; tie over the top with an oil-cloth, and carry the glafs into a dry cellar, and let the whole upon a bed of this prepared matter of four inches thick in a box; fill up the remainder of the box with the fame preparation, and let it be four inches thick over the top of the glafs, and round all its sides. Flowers are to be preserved in the fame fort of glaffes in the fame manner, and they may be taken up, after a whole year, as plump and as fair as when buried.

FLOWER Garden, the place where flowers are chiefly grown, cultivated and preferred. It should have a sheltered southern aspect, but which is not by any means close.

FLOWERS, in Antiquity. We find flowers in great request at the entertainments of the ancients, being provided by the master of the feast, and brought in before the second course; or, as some are of opinion, at the beginning of the entertainment. They not only adorned their heads, necks, and breasts, with flowers, but often bestowed the beds whereon they lay, and all parts of the room with them. But the head was chiefly regarded. Potter Archæol. Græc. tom. ii. p. 383. See Garland.

Flowers were likewise used in the bedecing of tombs. Potter Archæol. Græc. lib. iv. cap. 7. tom. ii. p. 232, seq. See Burial.

FLOWER, in Architecture, according to Vitruvius, is a representation of some imaginary flower, by way of crowning, or finishing, on the top of a dome, &c.

In bu of this the moderns commonly use a vase, ball, or the like.

FLOWER-de-lu-cé, Fleur-de-lis, in Heraldry, is a bearing anciently of great dignity; being reputed the noblet of all flowers, and as such having been in all ages the charge of the royal escutcheon of the kings of France, though time has made the bearing thereof more vulgar.

In some coats it is borne single; in others triple; in others it is, some, fedem all over the escutcheon. During the existence of monarchy in France the arms consisted of three flowers-de-lis or, in a field azure. These arms, however, were superseded in 1789 by the cap of liberty, and the three-coloured flag, when the battle was taken and destroyed by the inhabitants of Paris.

FLOWER of the Capital is an ornament of sculpture, in form of a rose, in the middle of the sweep of the Corinthian abacus.

In that of the Composite, it is not a rose, nor any real, but an imaginary kind of flower.

FLOWERS, in Chemistry, are the finest and most subtle parts of dry bodies, raised by fire, into the vessel's head, and added; and adhering to them in form of a fine powder, or dust. Such are the flowers of sulphur, benjamin, &c.

FLOWERS of Antimony. See Antimony.

FLOWERS Argentine, of regula of antimony, are made by putting the regula into an unvarnished earthen pot, placed in a furnace, so that its bottom may be red-hot, while its upper part shall be much colder. The pot is to be covered with a lid, without luting it, and heat is to be applied for an hour or more. When the pot is cold, its internal surface, and the remaining part of the regula are found covered with white flowers, in form of beautiful, transparent, and shining needles, which are to be gathered with a feather. After this, a second sublimation may be commended, and managed in the same manner; and the whole regula may be changed into flowers. These flowers appear to be nothing else than the earth of regula of antimony deprived of almost all its phlogiston. They are neither emetic nor purgative; they are soluble in aqua regia.

FLOWERS of Arsenic, white, are made, as all other flowers are, by subliming arsenic; from which they do not differ in their nature and properties.

FLOWERS of Benjamin, or Benzoin, are made by putting a quantity
quantity of this refined into a varnished earthen pan, and covering it with another inverted pan of flone-ware: and let the edges of these pans be made to fit well to each other, and to be well luted together with paper dipped in paste. Put the earthen pan containing the benzoin on a gentle fire, and with that the sublimation is performed; when the vesicles are cool and unluted, the flowers are to be swept off with a feather. For the properties and medical uses of these flowers, see Benzoin.

**FLOWERS OF BISMUTH. See BISMUTH.**

**FLOWERS OF COBALT. See COBALT.**

**FLOWERS OF COPPER** have been prepared by subliming falso-ammoniacum with the caput mortuum of blue vitriol. See COPPER.

**FLOWERS, Martial. See FLORES MARTIALIS.**

**FLOWERS OF SAL AMMONIAC** are nothing more than false ammoniac sublimed; and the sublimation is facilitated by generally mixing with it an equal part of decrystallized common salt. See SAL AMMONIAC.

**FLOWERS OF SULPHUR, or Bismuth.** are the vapours of melted bismuth conveyed from an iron pot (in which it is kept boiling) through a proper tube, into a close room or oven, where this vapour condenses into flowers. See SULPHUR.

**FLOWERS OF ZINC.** See CADMIUM and ZINC.

**FLOWERS, in the Animal Economy,** denote women’s monthly purgations, or menstrue.

Nicot derives the word in this sense from flower, q. d. flowers. Others will have the name occasioned, that women do not conceive till they have had their flowers; so that these are a sort of forerunners of their fruit.

**FLOWERS, in Rhetoric, are figures and ornaments of discourse,** by the Latins called florilegium.

**FLOWER-SCISSES, Barbados.** See POINCIANA.

**FLOWER-SCISSES, Bahama.** See Adenanthera.

**FLOWER OF BREEF.** See Lychnis.

**FLOWER OF CONJUNCTIVITIS.** See Lychnis.

**FLOWER DE-LUARD, in Botany.** See Iris.

**FLOWERS OF AN HOUR.** See Hibiscus.

**FLOWERS, Eternal, or Everlasting.** See GNAPHALIUM, GOMPHRENA, and XERANTHUM.

**FLOWERS, Four o’clock.** See Mirabilis.

**FLOWER, Gentle.** See AMARANTHUS.

**FLOWER, Side Saddle.** See Sarracenia.

**FLOWER, Sky.** See Cineraria.

**FLOWER, Sultan.** See Centaurea.

**FLOWER, Sun.** See Helianthus.

**FLOWER, Trumpet.** See Bignonia.

**FLOWER, Wind.** See Anemone.

**FLOWER OF OLEOCOCCA,** a name given by the people employed in finding the oleocolla to a fort of white marley matter, which they usually find on the surface of the ground in the places where the oleocolla lies underneath. It seems very nearly allied to the nature of the oleocolla itself, and usually has under it some of that blackish matter resembling rotten wood, which the oleocolla itself is formed upon, and which fills up those hollows we find in most of the pieces, while the whole is in the ground. This rotten vegetable matter has much the resemblance of the roots or branches of trees, and is called by the common people the root of the oleocolla or hammersel radix. Phil. Trans. N° 39. See OLEOCOCCA.

**FLOWER-root-worm, in Natural History,** a peculiar species of fly-worm, which makes its habitation only in the bulbous roots of flowers. The roots of the narcissus, at the time they are taken up out of the earth toward the end of autumn, very frequently are found to contain each a single worm which eats and destroys them. Sometimes, one root is found to contain two of them; but this is but rarely the case. The roots which have them may easily be known, by having each a round hole in some part, at which the destroyer has entered while it was small, and which probably serves it now in its large state for respiration of the free air. The interior part of these bulbs is always found rotted and destroyed, and the worm is found in them, lying in a brown frit of dirt made by its own liquid excrements, mixed among the fragments of the coats of the root which it has destroyed. Réaumur’s Hist. Insect. vol. iv. p. 499.

These worms undergo all their changes in a shell made of their own skin, which is of the same egg-shaped shape with that of the blue sickly-fly, but considerably larger, and of a greyish colour. But this is not all its difference from these shells; for on its anterior and superior part it has two horns of the same kind with the four of the shells of the rat-tailed worm; and seeming to force to the fame purposes, and to convey the air necessary for the life of the creature, into its coecula: the old firmament, which served the creature in its worm-state, being now obliterared, and something necessarily wanted in their place. After having undergone all the necessary changes, the shells are built open, in the month of April, and let out the fly they contained.

This has so much the appearance of a humble-bee, that at first sight it is scarce to be distinguished from it. It is covered with black, yellow, and reddish hairs, as the smaller kinds of the common humble-bees are; but its antennae, which are of the boredale fashion, prove plainly enough, that it is really no bee, even before one can determine with certainty that it has only two wings.

FLOWERAGE, a collection of flowers of several kinds set together in hanks, and hung up with strings.

FLOWERED, in the Manufacture. A stuff, or cloth, is said to be flowered, furred, fringed, or figured, when there are representations of flowers, either natural, or imaginary, wrought thereon.

There are fluffs flowered of almost all kinds of matter: flowers of gold, silver, silk, wool, thread, cotton, &c. Stuffings and cloths are usually designated from the ground wherein the flowers are raised.

Thus, there are flowered velvets, taffeties, damasks, fattins, moahs, dimities, &c.

Theodore flowered with gold and silver are more usually called brocades.

The flowers are usually wrought at the same time with the cloth, or ground. The threads of the warp are raised and lowered by means of packthreads passed through them in mounting the loom; and the manufacturer shooting his warp, or matter of the flowers, whether gold, silver, silk, or the like, between the threads thus raised, forms the flowers.

It is very curious to see them mount a loom; or, as they call it, read a design, to be represented on a stuff; but it is next impossible to describe it; yet we have endeavoured to give some idea thereof under Design.

FLOWERING, Bulbous-rooted Plants, in Gardening, the art of blowing these sorts of flower-plants in the house. This can be easily done by proper care, as they are capable of both growing and flowering in water without any sort of earth. When well managed in this way, flowers of this kind have a beautiful and elegant appearance, at a season when they cannot be found in other situations.

It is the usual practice to blow single roots in pots or glasses made for the purpose, nothing more being requisite than...
than that of supplying them properly with water, so as not to rise much upon the bulbs of the roots, as they are very liable to rot when they are too much immersed in water.

Other contrivances have likewise been had recourse to in order to blow several roots of the same, or other kinds together, in which situations they have very pretty effects. Where glass or earthen-ware flands for this purpose are not at hand, the bullfins may be easily and conveniently accomplished by means of a common garden pot, which should have the hole in the bottom perfectly closed, and two pieces of pretty strong sheet lead cut so as to exactly fit the bottom and top of the pot; proper holes should then be made in the upper piece for the reception of the root-bulbs, and small perforations formed in it, and the lower or bottom piece, for receiving suitable sticks for supporting the flowering items of the different roots. Water must then be poured in so as to fill the pot quite up to the upper plate of lead, when the roots should be placed in the large holes made for them, so as just to touch the surface of the water. Where different kinds are used, by Narcissus, Narcissus, jonquils, tulips, &c., they may be put in, in a varied manner, and placed in a rather warm situation in the house.

In this way the whole will be brought into flower at an early period, and continue for some time to afford a fine display of beautiful flowers. In this manner, by a careful regulation of the heat of the room, and an occasional proper supply of fresh water, they may be kept flowering from December till the beginning of the spring.

When they have done flowering, the roots should be removed and laid by in a dry, but not warm situation, until they may be wanted in the following season.

It is found by much experience that those bulbs which are kept in a dry flat flower by much the best, as they gradually take in that quantity of moisture which is necessary in the process, and are not liable to rot or full faint injury in that way.

The proper way of managing them is to let them at first only just come in contact with the surface of the water, that they may strike forth their root-fibres in a full manner, after which it may be raised a little higher to promote the full flowering of the plants. During the whole time of flowering, they should be kept quite steady by the support of proper sticks.

There is an advantage in flowering bulbous roots in glass flands, as they succeed equally well in them, by the progress of their roots being capable of being more perfectly judged of, and at the same time the supplies of water more conveniently afforded.

Such roots as have been in the ground are always improper for being employed in this way, as they never flower in any perfect manner. Before the roots are made use of, it is constantly necessary to lightly rub off all the loose old coaty matters that may hang about them. And it is a good practice to change the roots every two or three years, in order to prevent their becoming weak, and of course flowering imperfectly.

It has been observed that the early flowering of roots of this sort may be greatly promoted by the use of weak solutions of nitre, and ammonia in its crude state. Where either of them is tried, a small portion should only be poured into the pots or glazes containing the water at a time, and not too frequently repeated. See Root.

FLOWING, or Flow-sheets, in Sea Language, denote the positions of the sheets, or lower corners of the principal sails when they are loosed to the wind, so as to receive it into their cavities in a direction more usually perpendicular than when they are clove hawled, but more obliquely than when the vessel is failing before the wind. This position of the sheets takes place when the wind crosses the line of her course nearly at right angles.

FLOOD, in the Colour Trade, a very well cleaned wool, used to absorb the colours of cochineal, &c. It is prepared in this manner: infuse a pound of the finest shavings of woolen cloth in cold water for one day; then take them up, and press them well together, to wash off the uncertainty the wool naturally has. This is the simple flood, which, when impregnated with a solution of alum, is called alomed flood. This is done in the following manner: Take four ounces of roach-alum, and two ounces of crude tartar, both in fine powder; put them into an earthen vessel with three quarts of water, let it over the fire, and when it begins to boil, then put in the flood; let the liquor now boil half an hour over a gentle fire, then take it off, and when all is perfectly cooled, wash the vessel with fair water, letting them stand in it two hours, then press them in the hand, and let them dry.

FLOYD, in Geography, a new township of America, and chief place of a district in Ossaca Herkimer county, New York, containing 367 inhabitants.—Also, a county of Kentucky, containing 427 inhabitants, of whom 29 are slaves.

Floyd's Fork, a river of Kentucky, which runs into the river Salt. N. lat. 37° 48'. W. long. 85° 57'.

FLOYER, Sir John, in Biography, an eminent physician, was born at Hints, in Staffordshire, about the year 1649, and received his education at the university of Oxford, where the degree of doctor of physic was conferred upon him, on the 8th of July, 1680. He settled himself in the practice of his profession at Litchfield, in his native county; where his indefatigable attention to the sick, and the consequent practical skill which he attained, not only procured for him the confidence of the inhabitants, but gained him a reputation extensive, that his sovereign honours him with knighthood, as a reward for his talents. He was a great friend to the use of cold bathing, and left no means untried, by which he might diffuse the knowledge of its utility and safety, and bring the practice into general vogue; he particularly recommended it in chronic rheumatism, and in nervous disorders, and he maintained that consumptions had prevailed extensively in England only since the practice of baptizing children by immersion had been relinquished. There are the titles of his different publications. 1. "The Touchstone of Medicines," London, 1687, 8vo. 2. "The Preparative State of the Animal Humours described by their sensible qualities," London, 1696, 8vo., in which he maintained the doctrine of fermentation. 3. "An Enquiry into the right use of Baths," London, 1697, 8vo. This work afterwards appeared under different titles, such as "Ancient Psychrolathy revived," London, 1702; and the subject was more amply treated in another edition; 4. "History of hot and cold Bathing, ancient and modern, with an Appendix by Dr. Baynard," London, 1709, and again in 1715, and 1722. His next work was "A Treatise on the Althma," first published in 1668, and re-published in 1717 and 1726. He was himself the subject of althma from the age of puberty, yet lived to be an old man. 5. "The Physicians' Pulse-watch," 1707 and 1710, in two volumes, 8vo. Sir John Floyer was one of the first to count the pulsations of the arteries; for although the pulse had been the subject of observation from ancient times, the number of beats in a given time had not been attended to. 6. "Medicina Geromonica; of preferring old men's health; with an appendix concerning the use of oil and ointment, and a letter on the regimen of younger years," London, 1695.
London, 1724. Several of these treatises were translated into the continental languages.

FLUENTIA, in Chemistry, a genus of salts formed by the union of fluoric acid with any alkaline or faubulous base. Little is known of these salts, but the properties of the principal of them are enumerated in the article FLUID, to which the reader is referred.

FLUCTUATION denotes, in Surgery, the motion communicated to any collection of pulpy matter, or other kinds of fluid, by applying some of the fingers of each hand, at a certain distance from each other, to the surface of the tumour, and pressing with them alternately in such a manner, that the finger of one hand are to make a little pressure, while those of the other hand remain lightly placed on another part of the swelling. When the ends of one set of fingers are thus delicately applied, and the surgeon taps, or makes gentle pressure with the fingers of the other hand, the impulse given to the fluid is immediately perceptible to those fingers which are lightly laid on the tumour, and the sensation thus received is one of the principal symptoms by which practitioners are enabled to discover the presence of fluid in a great variety of cases.

When the collection of fluid is very deeply situated, the fluctuation is frequently exceedingly obscure, and sometimes not at all distinguishable. In this circumstance, the existence of the fluid is to be ascertained by the consideration of other symptoms. For example, in cases of hydrops pectoris, and empyema, surgeons do not expect to feel the undulation of the fluid in the thorax with their fingers; they consider the patient's difficulty of breathing, the uneasiness attending his lying on one particular side, the edema of the pates of the chief, the dyspepsia of other parts, the more raised and arched position of the ribs on the affected side of the body, the preceding rigors, fever, and several other circumstances from which a judgment is formed, both with regard to the presence and the peculiar nature of the fluid.

FLUDD, Robert, or as he styled himself in Latin, De Fluibus, in Biography, the second son of Sir Thomas Fludd, treasurer of war to queen Elizabeth, was born at Milgate, in Kent, in 1574. He was educated at St. John's college, Oxford; and after taking his degree in arts, attached himself to the study of physics, and spent almost ten years in his travels through the principal countries in Europe. It was probably during these peregrinations that he imbied a taste for the Rosy-Serican Philosophy, of which he was ever after a most strenuous supporter; and indeed almost the only one who became eminent in it in this kingdom. He proceeded as doctor of physic in 1605, and about that time settled in London, and was made a fellow of the college of physicians. He was a very voluminous author in his feet, diving into the farthest profundities and most mysterious obscurities of the Rosicrucians, and blending, in a most extraordinary manner, divinity, chemistry, natural philosophy, and metaphysics. Eloc allows him some credit on the score of mathematical and mechanical knowledge, but characterizes his physics as a tissue of impertinent nonsense. Yet such a vein of wrauth enthusiasm runs through his works, that we may readily suppose him to have been a believer in the mystical jargon of his system. He had the faculty, at all events, of impressing his patients with an idea of his importance, and of inspiring them with great faith in his skill, by the ufe, it is said, of a kind of sublime unintelligible cant, whether successful or not; he was therefore at least very eminent in his medical capacity. He died at his house in Coleman-street, London, on the 5th of September, 1637, and was buried in the parish church of his native place.

It is said that Dr. Fludd was in possession of the manuscripts of Simon Forman, the astrologer. Although the sect of Rosy-crusians is now entirely extinct, a list of the works of Fludd, which were chiefly written in Latin, may be given to the curiosity of the learned. The list, entitled, "Utriusque Caelestis, majoris et minoris, Technica Historia," opens, 1617, is two volumes folio, contains some extremely singular prints, which are intelligible only to an adept. 2. "Tractatus Apologeticus integritatem societatis de Rosca cecum defendendi," Leyden, 1617. 3. "Monochordon mundi nymphaeum, rei Preripiti ad Apologian Joannis Kepler," Francfort, 1624. 4. "Anatomie Theatra trium tripli cfficie dignitatum," ibid, 1625. 5. "Philosophia Sacra et vera Christiana, seu Meteorologia Comfica," ibid, 1626. 6. "Medicina Catholica, seu, Mythicum artis Medicandi Sacrarum," ibid, 1626. 7. "Integrum Morboyn Mysterium," ibid, 1631. 8. "De Morborum Signis," ibid, 1631. These two treatises are a part of the Medicina Catholica. 9. "Clavis Philosophiae et Alchemyi Fluddanae," ibid, 1632. 10. "Philosophia Mathea," Gouda, 1633. 11. "Pathologia Daemoniaca," ibid, 1632. Aikin, Biograph. Memoirs of Med. Ely, Dict. Hist.

It is true, that as the great Kepler, his contemporary, from the high respect which he bore even to the prejudices and philosophic dreams of antiquity, in his work, entitled "Harmonia Mundii," endeavors to illustrate and demonstrate the Pythagorean harmony of the spheres, and to reconcile it to geometrical laws, and the Copernican system; but as it was in this vain attempt that he made the great discovery of the elliptic orbits of the planets, his visionary analogies between the distance of the planets, and the harmonic intervals in music, have been excused. Now Fludd, anxious for the honour which he thought Kepler had gained by the very attempt which most disgraced him with posterity, in his fanciful demonstration of the music of the spheres, opposes him and his analogy with abuse and furyt, and sets up a sytem of his own still more wild and absurd; for in the third book of the first tract, entitled "De Musica Mundana," he supposes the world to be a musical instrument, resembling a monochord, extending from the summit of the empyrean heaven to the baits of the earth itself, dividing it into parts constituting consonances; so that if the half part were touched or struck, it would produce the consonant diapason, or octave, in the same manner as in the instrumental monochord. Malter doctor Fludd has given us a diagram of his sytem, representing his mundane monochord, the finger-board of which he has graduated by flats into a scale of disdiapason, to G sol re ut in the treble, and placed opposite to each note of this gamut, ascending from the earth, the elements of water, air, and fire; then the celestial bodies from the moon to Saturn, affixing a place to each orb opposite to some found of his musical scale.

After adjusting his mundane monochord, and dividing it into syllables of diatessaron, diapente, and diapason, our author, chap. iv., undertakes to demonstrate his whimsical hypotheses by the figure of a pipe or flute. But if our readers have had perseverance to follow us thus far, we can hardly suppose that their patience will last one inch farther; we shall therefore only observe, that this bewildered author, in order to enable himself to put together his system of metaphorical music, must previously have studied real practical music, concerning which, in his second tract, he speaks like other Christian fusts.

FLUDDER, or FLO-FLUFFER, in Ornithology, the name of a water-fowl of the columbus or diver-kind, described by Gellner, and some other authors, under the name of the

FLUDDER, or FLUDDE.
columbus maximus, or largest diver. See Columnus Glacialis.

FLUE, St. Nicholas de, in Biography, a very distinguished patriot of Switzerland, was born at Saxelen in 1417. Descended from an ancient family, he signalized himself in defence of his country, and particularly during the war which the Swifs supported against Sigimond, archduke of Austria. He was no less remarkable for humanity than valour. To his countrymen, when they were preparing to pillage and burn the convent of St. Margaret, near Dieffenboden, he exclaimed, "If God grants you the victory over your enemies, use it with moderation, and spare those cities which are consecrated to him." This remonstrance was effectual, and preferred the convent from destruction. To the most excellent qualities of the heart and understanding, to great political sagacity, he added the exterior graces of figure, dignity of character, and the most winning affability. Raised by his countrymen to high employments in the state, he repeatedly declined the office of landaman from motives of delicacy, because he disapproved the principles of the governing party. At length, hurried away by his detestation of evil, and a zeal for monkish devotion, he quitted his family in the 52th year of his age, and retiring from the world in a fit of gloomy superlusion, turned hermit. The place of his retreat was Ranft, a few miles from Saxelen, where he built an hermitage and a small chapel, and practised all the severities required by that austere mode of life with the strictest observance. But though he withdrew from the world, the flame of patriotism was not extinct; but he was the happy instrument in rescuing Switzerland from the impending horrors of civil discord. When a quarrel took place among the cantons, and the deputies assembled, in 1481, at Stantz, in order to compromise the difference, De Flue quitted his hermitage, and in the 64th year of his age travelled during the night, and arrived at Stantz on the morning when the deputies, having failed to terminate their dispute amicably, were preparing for their departure. He conjured them to remain; and, having by his mediation succeeded in composing the public dissensions, returned to his hermitage, where he died, in 1487, in the 64th year of his age, regretted and grieved by all Switzerland. Such a general opinion of his extreme piety prevailed among his contemporaries, that the bigotry of those times ascrib'd to him an exception from the common walk of human nature. The following epitaph was inscrib'd on his tomb: "Nicholas de Flue quitted his wife and children to go into the desert; he served God 19 years without taking any influence. He died 1487." — Coxe's Travels in Switzerland, vol. 1.

FLUR, the long tube of a chimney, from the fire-place to the top, for giving passage to the smoke. For a more particular account, see Chimneys.

FLUELLIN, in Botany. See Antirrhumin.

FLUENT, in Analysis. It is not easy to give such a definition of the term fluent as shall be intelligible to those not previously acquainted with the use of the word. And indeed mathematicians themselves differ in their conceptions of it according to the different points of view in which they have been accustomed to consider the principles of the fluxionary or differential calculus.

As the converse of a fluxion, a fluent is the flowing quantity, the rate of which increase is expressed by the fluxion. According to other writers the fluent or integral is the sum of an infinite number of small factors increasing or decreasing according to some given law, each of which may be considered as the fluxion or differential of the whole integral or fluent. See Fluxion.

According to the more accurate ideas of modern analysts, a fluent or integral is nothing more than an algebraic expression, consisting of variable quantities with or without others that are constant, which expression being expanded into a series according to certain rules, gives for the first term the fluxion or differential of which it is the fluent. In this view of the subject a fluent and its fluxion, or an integral and its differential, are merely certain analytical or symbolical relations, not depending on any theory relating to velocity, or indeed on any disputable hypotheses whatever, since it is founded on arbitrary definition alone: and it is presumed that this will be sufficient for all the purposes to which the application of the differential or integral calculus can possibly be applied. But the discussion of this subject will be again resumed under Analytic Function.

The most luminous and correct explanation of the real meaning of the term fluent is given by Mr. Woodhouse in the Transactions for 1772, in a paper on the independence of the analytical and geometrical methods of investigation. His object is to shew that analytical expressions, involved in geometrical language, are foreign to the subject, and tend to produce confused and erroneous notions. Such, for example, are the following: sin x; cos x; hypo. log. x; sin. n x = 2 cos x. sin. (n - 1) x - sin. (n - 2) x; f x (1 - x) = circular arc; f x \sqrt{1 - x^2} = elliptical arc, &c.

The value of f x (1 - x) is said to be a portion of the area of a hyperbola intercepted between two ordinates to its asymptotes; but as Mr. W. observes, this is a circunscriptory mode of expression, since to find the value of the area, (1 - x) must be expanded, and the integrals of the several terms taken, which same operation must have taken place in order to approximate to the value of f x (1 - x), if no such curve as the hyperbola had ever been invented.

Mr. W. then proceeds to explain what he himself understands by an integral or fluent of an expression. We shall use his own words.

Let x denote a function of x; if x be increased by θ then x becomes x + θ and x + θ, developed, according to the powers of θ, becomes x + P + Q x + Q x + &c., where P is derived from x, Q from P, R, Q, &c., by the same law, so that the manner of deriving P being known, Q, R, &c., are known. The entire difference or increment of x is x + θ - x; but the differential or fluxion of x + θ, is only a part of this difference, or P θ. If instead of θ, d x or θ be put, it is P d x or P + P d x; the integral or fluent of P + P d x is that function from which P + P d x is derived; and in order to remount to it, we must observe the manner or the operation by which it was deduced, and by reversing such operation the integral or fluent is obtained. Now in taking the fluxion of certain functions of x, it appears that there are conditions to which the indices of x without and under the vinculum are subject. Hence, whether not a proposed fluxion can have its fluent affined, we must see if the fluxion has the necessary conditions.

Expressions such as x, x + bx, x + bx, &c. have not these conditions; and consequently there is no function x of
FLUENT.

of \( x \), such that the second term of the development of \( \varphi \) \((x + \dot{x})\) is equal either to \( \frac{x}{x} \), or \( \frac{x}{1 + x} \), or \( \frac{x}{\sqrt{1-x^2}} \), &c. There are, however, integral equations from which such expressions may be derived. Thus, let \( x = \dot{x} \),
then \( \frac{x}{n} = \dot{x} \); let \( t + x = \dot{x} \), \( \frac{x}{1 + x} = \dot{x} \); let \( x = \frac{t}{\sqrt{1-x^2}} - \frac{1}{\sqrt{1-x^2}} \).

Now from these equations, the differential equations \( \frac{x}{n} = \dot{x}, \frac{x}{1 + x} = \dot{x} \), &c. may, by expunging the exponential quantities, be derived; consequently, if the symbol \( f \) is to designate a reverse operation, I can only know what that reverse operation is by attending to the manner in which the expressions affected with the symbol \( f \) were derived. Hence

\[
\int f(x) = z, \text{ when } x = e^t, \\
\int f(t) = z, \text{ when } t + x = e^t, \\
\int \frac{f(t)}{x} = z, \text{ when } x = (2 \sqrt{1-t})^{-1} \left\{ t - t^{-1} \right\}. \\
\int \frac{f(t)}{1 + x} = z, \text{ when } x = \left\{ e^t - 1 \right\}^{-1}.
\]

In like manner,

\[
\int f(x) = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int f(t) = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int \frac{f(t)}{x} = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}.
\]

Again, suppose \( x = \left\{ e^t - 1 \right\}^{-1} \left\{ t - t^{-1} \right\} \).

\[
\int f(x) = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int f(t) = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int \frac{f(t)}{x} = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}.
\]

And a variety of forms may be obtained by substituting

for \( x \) different functions of \( x \), in the expression \( \frac{z}{\sqrt{1-x^2}} \).

Hence if the symbol \( f \) is made to denote a reverse operation, the integral equations of the preceding differential equations have been rightly assigned. All other methods of assigning the integrals by the properties of logarithms, by circular arcs, by logarithmic and hyperbolic curves, are indirect, foreign, and ambiguous. Mr. Woodhouse next proceeds, by the above method, to integrate certain differential equations which Euler and Lagrange have before treated of, and which are said to admit for the complete integration an algebraic form, although the integration of each particular term depends on the quadrature of the circle and hyperbola.

Let \( f(x), f(y) \), denote functions of \( x \) and \( y \). Suppose the differential equation to be \( \frac{x}{n} + \frac{y}{y} = 0 \); then \( f(x) + f(y) = a \) when \( x = f(x), y = f(y) \). Hence \( x = f(x) + f(y) = a \), a constant quantity.

2dly. Let \( \frac{x}{\sqrt{1-x^2}} + \frac{y}{\sqrt{1-y^2}} = c \).

\[
\int f(x) + f(y) = a, \text{ being } \left\{ 2 \sqrt{1-t} \right\}^{-1}, \\
\int f(x) = \left\{ 2 \sqrt{1-t} \right\}^{-1} \left\{ t - t^{-1} \right\}. \\
\int f(y) = t - t^{-1}, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int \frac{f(x)}{x} = \left\{ e^t - 1 \right\}^{-1} \left\{ t - t^{-1} \right\}.
\]

Again, \( f(x) = \left\{ e^t - 1 \right\}^{-1} \left\{ t - t^{-1} \right\} \).

\[
\int f(x) = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}.
\]

In like manner

\[
\int \frac{f(x)}{x} = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int \frac{f(x)}{1 + x} = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int \frac{f(x)}{\sqrt{1-x^2}} = x, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}, \\
\int f(x) = x^2 + \sqrt{1 + x^2} = e^t, \text{ or } x = \frac{\sqrt{1 + x^2} - 1}{\sqrt{1 + x^2} + 1}.
\]

And a variety of forms may be obtained by substituting

for \( x \) different functions of \( x \), in the expression \( \frac{z}{\sqrt{1-x^2}} \).
By t. Thus Japan. which vii. (habit, - Turin, + smallne(s whereas when deep, 2. account diftinguifhed A, and J to Pif. 1784, + rela- fix integratting pea, hardy ^ foot the 4- rich their this, torn. direft I nor fac. "Comm. Thunberg F. broad the iligma anfwer prefTions. But, is logarithms, there Novi account of the method above described. See likewife Euler, Calc. integral, vol. ii. Novi Comn. Petrop. tom. vi. p. 37 ; tom. vii. p. 1. It is to be observed, that in the present state of analytic science, there is no certain and direct method of integrating differential equations, such as \( \int \frac{x}{1-x^2} + \int \frac{y}{1-y^2} \), &c., because no analytical expression or equation of a finite form has hitherto been invented, from which, according to the processes of the differential calculus, such differential equations may be deduced. To find the algebraical expressions which answer to these equations, recourse must be had to what are properly denominated artifices. For such, see Mem. de Turin, vol. iv. Comm. Petr. tom. vii. Lagrange. Fonct. Analyt. p. 86. La Croix Calc. diff. p. 427; &c.

FLÄUGGE, in Botany, so named by M. Louis Claude Richard, in honour of Mr. John Flügge, a very able German botanist of the present day, whose affilience is particularly acknowledged by professor Schradt in the first volume of his own truly excellent Flora Germanica, just imported into this country. Richard in Schradt's New Journal, v. 2. fac. r. 8. (Ophiopogon ; Gawler in Curt. Mag. v. 27. 163.) Clas and order, Alexandria Monogynia. Nat. Ord. Sartrractae, Linn. Aparatagi, Jaff.

Gen. Ch. Cal. none, except, with Richard, we take the corolla for fuch. Cor. inferior, of one petal, bell-shaped, in fix deep, equal, oval, spreading, permanent segments. Stam. Filaments fix, very short, inserted into the bafe of the corolla ; anthers oblong, vertical, erect, shorter than the corolla, somewhat arrow-shaped at the bafe. Pub. Germin superiour, in the bottom of the corolla, roundish, of three cells, with rudiments of a double row of seeds in each; style solitary, rather longer than the flamen, erect, columnar, furrowed, tapering at the fummi; stigma minutely bearded, acute. Peric. Berry superiour, globofe, when ripe generally of one cell only. Seed foliary, large, obicular, carilhous.


A. (Ophiopogon japonicus; Gawl. in Curt. Mag. r. 163,) Convallaria japonica; Thunb. Jap. 140. &c. Linn. Syst. 224. Ait. H. K. v. 1. 457. Willid. Sp. Pl. v. 2. 160. Redout. Lil. v. 2. t. 850. Mondon; Kämpf. Amer. 823. t. 824. Adamson. v. 2. 496.) Grafs-leaved Flüggea, or Japan Suckle, Native of flindy places among shrubs, near Nagasaki in Japan. Thunberg. Kept with us in greenhoufes, where it flowers in June. Thunberg made it known to the Dutch, from whose gardens we obtained roots in 1784, and who treat it as a hardy plant. The root is perennial, creeping by means of fliny horizontal flroots, which are mucilaginous and nutritive. Stem none. Leaves radical, numerous, naked, grantly, linear, recurved, blufh, flat, rough-edged, winged at the bafe with a broad thin membrane. Stalk central, solitary, much shorter than the leaves, compressed, racemous. Flowers drooping, small, white, or blue, with yellow anthers. Berry the size of a pea, of a rich deep blue. The leaves in our plants are from three inches to a foot long. Thunberg speaks of a variety in which they exceed two feet, but of this we know nothing.

This plant appears to be properly enough separated from Convallaria, on account of its habit, and perhaps the effential characters given above may serve to define the genus, which was published by the two writers to whom we have referred, in the same year, unknown to each other. We conceive the gemen is proved by analogy to be truly superior, and the ripe fruit is altogether so; nor can we account for that part of M. Richard's description which represents it as "fearred at the top by the veftige of the flower;" this, if true, would decide the fruit and gemen to be inferior. Redoute's beautiful figure faithfully represents the plants in quidion. Richard's plate is more minute as to the ftructure of the flower, and flows the gemen to be in an early flate attached to, and as it were imbedded in, the bafe of the corolla, but the more advanced flate of the fruit proves that it cannot be deemed even halff inferior, nor is it, by that mark, to be discriminated from Convallaria.

FLUIDITY, in Physis, that flate or affection of bodies which denominates or renders them fluid.

Fluidity fluids in direct opposition to ffirmnes, or fo- lidity, which see.

Fluidity is distinguished from liquidity or humidity, in that the idea of the first is absolute, and the property contained in the thing itself; whereas that of the latter is relative, and implies wetting, or adhering, i.e., somewhat that gives us the sensation of wetness, or moifure, and which would have no existence but for our fentes.

Thus melted metals, air, or ether, and even smoke, and flame itself, are fluid bodies, but not liquid ones; their parts not leaving any fene of moifure; whereas water, milk, wine, &c. are at the fame time both fluids and liquids.

The nature and caufes of fluidity have been variously affigned.

The Gaffendifts, and ancient Corpusceleans, require only three conditions as neceffary to it, viz. a smallness and smoothness of the particles of the body; vacuities interpreffed between them; and a spherical figure. Thus the Epicurean poet Lucretius:

"Illa antem debent ex levibus atque rotundis. Elle magis, fluindo quae correps liquida contraet."

The Carteifans, and after them Dr. Hook, Mr. Boyle, &c. before the circumstances above mentioned, require a various, perpetual, intertine motion of the particles of the bodies, as that which principally contributes to fluidity.

Fluidity
FLUIDITY.

Fluidity then, according to these philosophers, consists in this, that the parts of the body, being very fine, and small, are so disposed by motion, or figure, as that they can easily slide over one another's surfaces all manner of ways; and that they be in constant, various, separate agitation to and fro; and that they only touch one another in some few parts of their surfaces. Mr. Boyle, in his "History of Fluidity," mentions three conditions principally required to fluidity, viz.

1. The minutest of parts; thus, in effect, we find that fire, by dividing metals into fine, small parts, renders them fluid; and that acid meuliirum diffuses and renders then fluid after the like manner; and that fire turns the hard body of common salt almost wholly into a liquor, by distillation; not but that the figure of the particles may have a considerable fluid in fluidity.

Thus mercury, whose parts are doubtless much greater than those of oil and water, is yet more fluid than either of them: and thus oil, by the action of fire, may be converted into a constant substance like butter.

2. A number of vacuities interposed between the corpuscles, to give room for the several particles to move among themselves.

3. A motion and agitation of the corpuscles; either from some principle of mobility within themselves, or from some extraneous agent, penetrating and entering the pores, moving variously among them, and communicating to them a part of its motion.

That this last is the qualification chiefly required in fluidity, he argues from divers observations and experiments. Thus, a little dry powder of alkaline, or platter of Paris, finely sifted, being put in a vessel over the fire, soon begins to boil like water; exhibiting all the motions and phenomena of a boiling liquor. It will tumble variously in great ways like that; it will bear the jostling with a flick or lade like that, without refilling; may if strongly stirred near the side of the vessel, its waves will apparently dash against them; yet it is all the while a dry powdered powder.

The like is observed in sand; a dish of which being set on a drum-head, briskly beaten by the flicks, or on the upper floor of a mill, it in all respects emulates the properties of a fluid body. A heavy body, e. g. a stone, will immediately sink in into the bottom, and a light one emerge to the top. Each grain of sand has a constant vibratory and dancing motion; and if a hole be made in the side of the dish, the sand will spout out like water.

That the parts of fluids are in continual motion, the Cartesians evince from divers considerations: as, 1. The transformation of solids into fluids, e. g. ice into water, and vice versâ; the chief difference between the body in these two states, confining in this, that the parts being mixed and at rest in the one, refil the touch, whereas in the other, being already in motion, they give way to the flattest impulse.

2. The effects of fluids, which commonly proceed from motion: such are the infiltration of solids among the pores of bodies; the softening and dissolving of hard bodies; the actions of corrosive meuliirum, &c. Add, that no solid can be brought to a state of fluidity without the intervention of some moving or moveable body, as fire, air, or water.

Air the same gentlemen hold to be the first spring of these causes of fluidity, it being this that gives motion to fire and water, though itself receives its motion and action from the ether or subtle medium.

Boerhaave, however, pleads strenuously for fire's being the first mover, and the cause of all fluidity in other bodies, as air, water, &c. Without this, he shews that the atmosphere itself would fix into one solid mass. To the same purpose, Dr. Black maintains that fluidity is the effect of heat. The different degrees of heat which are required to reduce different bodies into a state of fluidity, he supposes, may depend on some particulars in the mixture and composition of the bodies themselves; and this is rendered further probable from considering that the natural state of bodies in this respect is changed by certain mixtures: accordingly, when two metals are compounded, the mixture is commonly more fusible than either of them separately. See Fire and Heat.

Sir I. Newton sets aside this theory of the cause of fluidity, and substitutes instead of it the great principle of attraction. The corpuscular system, with all the improvements of Descartes and Mr. Boyle, did not sufficiently account for the primary condition, requisite to constitute a body fluid, viz. the various internal motion and agitation of its parts. But this motion is naturally enough accounted for, by supposing it a primary law of nature, that as all the parts of matter attract each other within a certain distance; so at all greater distances they fly from, and avoid one another. For then, though their common gravity, together with the pressure of other bodies upon them, may keep them together in a mass, yet their continual endeavour to avoid one another singly, and the adventitious impulses of heat and light, or other external causes, may make the particles of fluids continually move round about one another, and so produce this quality.

There is a difficulty, indeed, in accounting why the particles of fluids always keep at such a distance from one another, as not to come within the sphere of one another's attraction. The fabric and constitution of that fluid body, water, are amazing; that a body so very rare, and which has a vast proportion of pores, or interposed vacuity, to solid matter, should yet be incompressible by the greatest force, as philosophers very generally, and for a long time have imagined, (see Compression:) and yet this fluid is easily reducible into that firm, transparent, friable body, which we call ice, by being only exposed to a certain degree of cold.

One would think, that though the particles of water cannot come near enough to attract each other, yet the intervening frigerosic mater doth, by being mingled per minima, strongly attract them, and is itself likewise strongly attracted by them, and so wedges or fixes all the mass into a firm solid body; which solid body takes its fluidity away, when by heat the viscillum is solved, and the frigerosic particles are disjoined from those of the water, and are forced to fly out of it. And thus may the fumes of lead, perhaps, fix quicker.

When a firm solid body, such as metal, is by heat reduced into a fluid, the particles of this new and separable its constituent parts, which their mutual attraction caused before to cohere, and keep them at such a distance from one another, as that they are out of the sphere of each other's attraction, as long as that violent motion lasts; and when by the lightness and activity they are solved off, unless they be renewed by a continual supply, the component particles of the metal will come near enough again to feel one another's attraction.

As, therefore, the cause of cohesion of the parts of solid bodies appears to be their mutual attraction, so the chief cause of fluidity seems to be a contrary motion, impressed on the particles of fluids; by which they avoid and fly one another, as soon as they come at, and as long as they keep at such a distance from each other.
It is observed also in all fluids, that the direction of their
preference against the vessels which contain them is in lines,
perpendicular to the sides of such vessels; which property,
being the necessary result of the particles of any fluid's
being spherical, shows that the parts of all fluids are to, or
of a figure very nearly approaching to it. See Fluids.

**Fluidity of the Earth, in Geology.** It has been a favourite
topic with many of the writers on the theory of the earth,
to enlarge on a supposed fluidity of the materials of which
the solid matters of the globe are now composed, not only
perpetually at the successive periods of their organic forma-
tion, but since, in consequence of the sudden and violent
disintegration or demolition of the ancient mountains and
strata, at the period when the organic remains of animals
and plants were lodged in the present strata; and which
took place, according to most of the followers of this
hypothetical, at the time of the Mosaic deluge: it is said,
however, by some late writers, that the relation of that
event, as given in the sacred writings, (and whence else
can we gain any certain knowledge of such an event?) gives
us no ground for admitting this disintegration or total de-
struction of the antediluvian earth, or the opinion of its
having been at that time reduced to a state of fluidity. In
the article Elipsoid figure of the earth, the writer of that
article has endeavoured to shew, that such fluidity of
the materials of which the globe is at present constituted,
is not any way necessary towards accounting fully for
the present form and dimensions of the earth, as resulting
from its gravitation and rotation on its axis. Those who
have contended for an entire fluid state of the earth, or at least
of so much of its materials as compose the crust thereof,
with which alone we are acquainted, surely never turned
their attention to the vast depth and quantity of water or
other fluid which would be necessary for its solution, or
even suspension, at one time, as seems necessary, or to the
circumstances under which so perfectly heterogeneous a
fluid could be supposed to deposit distinct substances, with
the surpising regularity in which the strata are disposed, in
orders totally different from that of their specific gravities.
See Order of the Strata.

**Fluids** are bodies, whose particles are but weakly
connected, their mutual cohesion being in a great measure
prevented by some interfering cause. In this sense a fluid
stands opposed to a solid.

Sir I. Newton defines a fluid body, to be that whose
parts yield to the smallest force impressed, and by yielding
are easily moved among each other.

That the particles whereof fluids consist are of the same
nature, and have the same properties, with the particles of
solids, is evident, from the conversion of liquids and solids
into each other, e. g. of water into ice, of metals into
fuels, &c. Nor can it be reasonably doubted, that the
component parts of all bodies are the same, viz. hard, solid,
impenetrable, moveable corpuses.

We observe, therefore, with Dr. Clarke, that if the parts
of a body either do not touch each other, or easily slide
over one another; and are of such a magnitude, as that
they may be easily agitated by heat, and the heat be
sufficiently great to agitate them, though it may perhaps
be less than suffices to prevent water from freezing; or,
even, though the parts be not actually moved, yet, if they
be small, smooth, slippery, and of such a figure and
magnitude as dispose them to move, and give way, that
body is fluid.

And yet the particles of such fluid bodies do, in some
measure, cohere; as is evident hence, that mercury, when
well purged of air, will be suffused in the barometer to
the height of 60 or 70 inches; that water will ascend
in capillary tubes even in vacuo; and that the drops of
liquor in vacuo run into a spherical form; as adhering
by some mutual cohesion like that between polished marble
plates. Add, that these fluid bodies, if they confit of
particles that are easily entangled within each other, as
oil, or if they be capable of being flattened by cold, and
joined by the interpolation of little cures or wedges, as
water; they are easily rendered hard; but if their particles
be not so entangled, they are movable by heat; or, if
them be not so entangled, they are movable by heat;
which was supposed to be the case with regard to quicksilver;
then they would never grow hard and
fixed. It is more probable that the primary cause of
fluidity should consist in the imperfect cohesion of the con-
fstituent parts of fluids rather than in their figure. For if
the particles of a body cohere strongly together, they
cannot easily move amongst each other. It is also evident
that the smallness of the particles of fluids will contribute
to their imperfect cohesion, because the surface of a body
composed of small particles must be more smooth and even,
than the surface of a body composed of large particles,
and two flat bodies may be conceived to consist of particles
so small that their surfaces shall differ insensibly from per-
fet planes, so that if these bodies were placed upon
one another, they would slide without the least sensible
friction. Moreover, if the particles of these bodies, thus
placed on each other, be by any means deprived of the
whole, or the greatest part of their cohesion, the bodies
will not only slide on each other in the fore-mentioned plane,
but the parts of them may also slide along each other in
any other direction whatsoever. Consequently they would
readily yield to any impressed force, and in yielding be
easily moved amongst each other, and thus constitute,
agreeably to the definition, a fluid mass. But a perfect
fluid, or that whose parts may be moved from each other
by the least force, exists only in the imagination: for inde-
dependently of its gravity or weight, or tendency towards
the centre of the earth, every non-clastic fluid possest the
attraction of aggregation (viz. of the mutual attraction of
its parts) in a particular degree; of the attraction of co-
hesion, which is likewise, in a particular degree, towards
other bodies; and of the attraction of affinity. Besides,
all fluids manifest more or less a sort of obtrusion, or
resistance to a perfectly free motion. See Affinity,
Aggregation, Attraction, Cohesion, Friction and
Resistance.

Fluids are called either natural, as water and mercury; or
animal, as blood, milk, bile, lymph, urine, &c., or fluidus,
as wines, spirits, oils, &c. See each under its proper article.

Fluids are more commonly distributed by the philo-
osophers into clastic and non-clastic. An elastic fluid is that
of which the dimensions are subject to be altered by augmenting
the pressure, and enlarged by diminishing the pressure upon it:
whereof kind are the different sorts of airs or gases. (See
Gas.) A non-clastic fluid is that, whose dimensions are not,
at least as to length, affected by the increase of pressure,
as mercury, water, &c. These latter are said to be non-
clastic, or incompressible, not because they are absolutely so;
but because their compressibility is so very small, as to
make no sensible difference in our calculations relative to
the pressures, movements, and other properties of these fluids.
See Compression.

The doctrine and laws of fluids are of the greatest extent
in philosophy. The pressure and gravitation of bodies in
fluids, and the action of the fluids in them, make the
subject of Hydrostatics, which see.

**Fluids, Hydrostatics** &c. 1. The upper parts of
all fluids, as water, &c. do pres upon the lower; or, as some philosophers state it, all fluids do gravitate in proprio loco.

The contrary of this was a principle in the school-philosophy; and two iacs have been commonly urged in support of it. A bucket full of water is lighter in the water than out of it, nor does it weigh more when full in the water, than when empty out of it; therefore, it has been concluded, that the water in the bucket, because it is within water, its own el-ment, does not gravitate: and divers, who descend to considerable depths, it has been said, feel no sensible preffure under water; though at the depth of thirty-two feet, the additional preffure they fulfill is not less than twenty thousand avoidpous pounds: for, supposing the surface of the body to contain only ten square feet, and a cubic foot of water to weigh one thousand avoidpous ounces, 32 x 10 feet, or 16 x 20 feet of water will weigh 16 x 20,000 avoidpous ounces, or twenty thousand pounds. However, in this case the uniformity of the pressure, the increased elasticity and refilance of the compreffed internal air, and the firm texture of the membrances, &c. may prevent their complaining of any sensible pain: though there have been many instances to the contrary, in which the difference of the preffure has produced very injurious effects. See Diving.

As to the former fact, it is easily explained by the theory of specific gravity, (which fee). The bucket of water weighs in water, but does not overweigh; because the surrounding parts of water endeavour to descend as well as the bucket, and with equal force, and therefore do not permit it to descend. Thus, according to an observation of Dr. Defaguliers, if two pound weights were hung at the two arms of a balance, no one will say, that neither weighs, because it does not outweigh the other. Defag. Exp. Phil. vol. ii. p.96.

Besides, it is evident, that, in any fluid, the weight of the whole is equal to the weight of all its parts; and if any part be taken from the whole, the weight of the whole will be diminished by the weight of that part; and if any part be added to the whole, the weight of the whole will be increased by the weight of the part which was added; and, therefore, it is reasonible to conclude, that the weight of the whole is composed of the weights of the several parts, and that the parts do, therefore, gravitate in the whole, or in proprio loco. (Cotes's Hyd. and Pneum. Lectures, p. 7.) But the certainty of such preffure is now demonstrated by a thousand experiments; it will be sufficient to instance one or two.

Immerge a tube, open at both ends, and half filled with oil of turpentine, in a vessel of water, the upper end of the tube being stopped with the finger: if now the upper surface of the oil be as low as that of the water, the oil, upon removing the finger, will not run out at the lower end of the tube; but, and if the tube be thril a little lower, the water will rise up in it, and bear the oil above it; but if the upper surface of the oil be considerably higher than that of the water, the oil will drop out of the tube. Whence it follows, that the column of oil in one cafe preffes or gravitates less on the plane imagined to pass under its lower surface than a column of water; and in the other cafe more.

Or thus: a phial, with as much flux in it as will make it sink, clofe flux, being immerged in water, and fupforded by a robe-f'airf to the beam of a balance, with a weight at the other end exactly counterpoofing it: upon unlopping the phial, and filling it with water, it will preponderate, and bear down the end of the balance, without having any communication with the external air. And if the phial had been initially weighed in air, it will be found, that the weights necessary for reftoring its equilibrium in water answer exactly to the additional weight of the phial, when it is again weighed in water with the water in it: so that water weighs in water just as much as in air.

These two experiments abundantly prove the propagation, that the upper parts of fluids do really preff or gravitate on the lower. See Specific Gravity.

From this gravity it follows, that the surfaces of flangent fluids are plain and parallel to the horizon; or rather, that they are segments of a sphere or spheroid concentrical with the earth, because they all gravitate towards the cenfus of the earth.

For, as the particles are suppolled to yield to any force imprefsed, they will be moved by the action of gravity, till such time as none of them can defend any lower. And in this fution, once attained, the fluid must remain at rest, unless put in motion by some foreign caufe; inasmuch as none of the particles can now move without ascending, contrary to their natural tendency.

In this cafe the centre of gravity of the fluid, contained in a vefsel open at top, will lie as low as it possibly can. Thus, let A B D C (Hydraulics. Plate V. fig. 1.) represent one fide of a rectangular vefsel, containing water as high as E F, whole centre of gravity is G; it is easy to prove that when the surface of the water is flat and horizontal, as E F, then the centre of gravity of the water lies lowest; but that if the water be elevated on any part of that furface, and of course lowered on any other part, then the centre of gravity will be removed to some place higher than G. Imagine that the water be difpofed into the fution D K B C, viz. that the portion K E H B is removed to the place B H F; and in this cafe the centre of gravity L of the quantity of water K D H F C remains in its original fution, whilst the centre of gravity of the quantity of water K E H B has been removed higher, viz. from I to S. Now, since the common centre of gravity of two bodies is in a straight line between the repective centres of gravity of those bodies; therefore, the common centre of gravity of both the quantities of water formerly laid at G, is in the line I S; whereas it now flands at O in the line L S, viz. evidently higher than the level of G, which is the line L O. This reafoning, applied to one fide of the vefsel, may be easily adapted to any fection of the water and vefsel, as also to veftils of any shape, and to any irregularity which the surface of the water may be put to acquire; for in any cafe the conclusion is exactly the fame, namely, that the centre of gravity of a given quaitity of some uniform fluid, like water, which is contained in an open veftel of any shape, flands at the loweff possible situation, when the whole surface of the fluid is in the fame horizonal line.

If a body be immersed in a fluid, either wholly, or in part, its loweff face will be preffed upwards by the water and creafht it; and the preffure of fluids upwards is equal to the preffure downwards at the fame place.

The truth of this propofition is evident from the experiment above mentioned, where the oil of turpentine was fupfended and made to mount up in the tube, by the preffure of the water upwards on its lower parts. Thus also, if the upper end of a narrow bored tube be efvved into quick-filver, whilst the other end is fupened with the fingers, and the tube be filled up, a part column of quick-filver will be fupfended in the lower end, whole column, when diipped into water deeper than about twenm times its own length,
will be pressed upwards, after the finger is removed from the orifice.

This upward pressure of fluids may be evinced by causing a piece of lead, &c. to swim in water; which may be done by immersing it to a proper depth, and keeping the water from getting above it. Let C D, Plate V. Hydrodynamics, Fig. 2, be a glass tube opened at both ends, and E F G a flat piece of lead, half an inch thick, exactly fitted to the lower end of the tube, which its upper surface covered with wax, so as to hinder the entrance of the water contained in the outer vessel. Let this leaden plate be held close to the tube, by pulling the string or wire J H L upward at I, with one hand, whilst the tube is held in the other by the upper end C. In this situation, let the tube be immered in water in the glass-veiled A B, to the depth of six inches below the surface of the water at K; and then the leaden plate E F G will be plunged to the depth of somewhat more than eleven times its own thickness: holding the tube at that depth, you may let go the wire or thread at L; and the lead will not fall from the tube, but will be kept to it by the upward pressure of the water below it, occasioned by the height of the water at K above the level of the lead. For, as lead is 11.33 times as heavy as its bulk of water, and in this experiment is immered to a depth somewhat more than 11.33 times its thickness, and no water getting into the tube between it and the lead, the column of water E a b c G, below the lead, is pressed upwards as much by the water K D E G L, all round the tube; which water, being a little more than 11.33 times as high as the lead is thick, is sufficient to balance and support the lead at the depth K E. If a little water be poured into the tube upon the lead, it will increase the weight upon the column of water under the lead, and cause the lead to fall from the tube to the bottom of the glass vessel, where it will lie in the situation b d; or if the tube be raised a little in the water, the lead will fall by its own weight, which will then be too great for the pressure of the water round the tube on the column of water below it. If the plate were brass instead of lead, it ought to be immered under water at least eight times its thickness, in order to be supported by the water; because brass is about eight times specifically heavier than water. A plate of pure gold would require near twenty times its thickness of water; and this led Mr. Boyle to propone one of his hydrodynamical paradoxes in these words, \( \text{\textit{Ter}} \). That a solid body, as ponderous as any yet known, though near the top of the water it will sink by its own weight, yet immered in water at a greater depth than that of twenty times its thickness, will not sink, if its denser be not affected by the weight of the immerced water. (Paradigm 11. Statics. Boyle's Works, abr. by Shaw, vol. ii. p. 311.)

As we have now seen that the heaviest body may be made to swim in water, the lightest wood may be made to lie at the bottom of water or mercury. Thus, let two pieces of wood be planed quite flat, so that no water may get between them when they are put together; let one of them, b d, be cemented to the bottom of the vessel A B, Fig. 2. and the other be laid flat and close upon it, and held down with a flick, whilst water is poured into the vessel, then remove the flick, and the upper piece of wood will not rise from the lower one, for as the upper one is pressed down both by its own weight and the weight of water over it, whilst the contrary pressure of the water is kept off by the wood under it, it will lie as well as the heaviest body: but if it be raised at the edge, so that the water may get under it, it will immediately be pressed upwards; and as it is lighter than its bulk of water, it will rise and float on the surface of the water. See Ferguson's Lectures, 4to. p. 68. and Cotes' Hyd. Lev. 2. See Hydrostatical Experiments, and Art. 11. in the sequel.

The law or quantity of this pressure in this; that a body immered in a fluid loses just so much of the weight it would have in air, as so much of the fluid as is equal to it in bulk, if weighed in the air, would amount to.

This pressure of fluids on the lower parts of an immered body is farther confirmed, by attending to the reason why bodies, specifically lighter than fluids, ascend therein. The effect is owing to this, that there is a greater pressure or weight on every other part of the plane or surface of the fluid imagined to pass under the lower surface of the body, than there is on that wherein the emerging body inflicts. Consequently, to produce an equilibrium in the fluid, the parts immediately under the rising body being pressed by the rent every way, do continually force it upwards.

In effect, the emerging body is continually pressed on by two columns of water, one bearing against its upper and the other against its lower parts: the length of both which columns being to be estimated from the top of the water, that which presses on the lower part will be the longer, by the thickness of the ascending body, and consequently will overbalance it by the weight of as much water as will fill the space that body takes up.

Hence, 1. We are furnished with one reason, why very minute corpuscles, either heavier or lighter than the liquor they are mingled with, will be sustained therein a good while, without either emerging to the top, or precipitating to the bottom; the difference between the two columns of the fluid being here inconceivable.

Hence, 2. If a body A be specifically lighter than B, an equal portion of the fluid in which it is immered, it will rise with a force proportionable to the excess of gravity of B above A; and if A be specifically heavier than B, it gravitates and descends with the excess only of its weight above that of B.

Hence, 3. We have, as some say, a solution of the phenomenon of two polished marbles or other planes adhering so strongly together; because the atmosphere presses or gravitates with its whole weight on the under surface and sides of the lower marble, but cannot do so at all on its upper surface, which is closely contiguous to the upper and fulscended marble. See Coxi's Hydrodynamics.

3. The pressure of the upper parts of a fluid on the lower exerts itself in every way, and every way equally, laterally, horizontally, and obliquely, as well as perpendicularly.

For, as the parts of a fluid yield to any impression, and are easily moved, it is impossible any drop should remain in its place, if, while it is pressed by the superficemont fluid, it be not equally pressed on every side.

The fame is confirmed from experiments: for several tubes of divers forms, straight, curved, angular, &c. being immered in the same fluid, though the apertures through which the fluid enters be differently polised to the surface of the plate, some being perpendicular others parallel, and others variously declined; yet will the fluid rise to an equal height in them all. See STYPON.

Hence, 1. All the particles of fluids being thus equally pressed on all sides, it is argued, that they must be at rest, and not in continual motion, as has been usually supposed.

Hence, 2. Also, a body being immered in a fluid, sustains a lateral pressure from the fluid; which is also increased as the
the body is placed deeper beneath the surface of the fluid.

4. In tubes that have a communication with each other, whatever their magnitude be, whether equal or unequal; and whatever their form, whether straight, angular, or crooked; still fluids rise in them to the same height.

5. If a fluid rise to the same altitude in two tubes that communicate with each other, the fluid in one tube is a balance, or equal in weight to that in the other.

If the tubes be of equal diameters, the columns of the fluid, having the same base and altitude, are equal, and consequently their gravities equal; so that they presst and gravitate against each other with equal force.

This is demonstrated from mechanics. E. gr. Let the base of GI, Plate V. Hydraulica, fig. 3. be supposed quadruple the base of HK; and let the fluid descend in the greater tube the space of an inch, as from L to O; it will then rise in the other the space of four inches, as from M to N. Wherefore the velocity with which the fluid moves in the tube HK is to that with which it moves in GI as the base of the tube GI to the base of the other, HK. But the altitude of the fluid being supposed the same in both tubes, the quantity of the fluid in the tube GI will be to that in the other tube HK, as the base of the tube GI to the base of the other HK.

Consequently, the momentum of the fluid in the tube GI is to that in the tube HK, as the product of the base of the tube GI into the base of the other HK, to the factum of the tube HK into the base of the other GI. Wherefore, the products being equal, the moments must be equal.

The same is easily demonstrated where one of the tubes is inclined, and the other perpendicular, &c.

6. In communicating tubes, fluids of different specific gravities will equiponderate, if their altitudes be in the ratio of their specific gravities.

Hence we have a way of finding the specific gravities of fluids, viz. by pouring one fluid into one of the communicating tubes, as AB (fig. 4.) and another into the other tube CD; and measuring the altitudes GB and HD, at which they stand when balanced.

For the specific gravity of the fluid in A B is to that in DC, as DH to BG. If the fluids employed in this experiment be apt to mix, it may be proper to fill the horizontal tube BD with mercury to prevent the mixture.

Hence, since the densities of fluids are as their specific gravities, the densities will likewise be as the altitudes of the fluids DH and BG; so that we have hence likewise a method of determining the densities of fluids.

7. The bottoms and sides of vessels are pressed in the same manner, and by the same laws, as the liquids contained in them.

And hence, as action and reaction are equal, the fluids themselves sustain an equal pressure from the bottoms and sides. And as the pressure of fluids is equal every way, the bottoms and sides are pressed as much as the neighbouring parts of the fluid; and consequently this action increases in proportion to the height of the fluid, and is equal every way at the same depth; as depending altogether on the height, and not at all on the quantity of the fluid.

8. In perpendicular vessels of equal bases, the pressure of fluids on the bottoms is in the ratio of their altitudes. This is evident, because, the vessels being perpendicular, the bottoms are horizontal; consequently the tendency of fluids by the action of gravity will be in lines perpendicular to the bottoms, so that they will press with all their weight; the bottoms therefore are pressed in the ratio of the gravities. But the gravities are as the bases, and the bulks here are as the altitudes; therefore the pressure on the bottoms are as the altitudes.

9. In perpendicular vessels of unequal bases, the pressure on the bottoms is in a ratio compounded of the bases and altitudes.

From the preceding demonstration it appears, that the bottoms are pressed in the ratio of the gravities; and the gravities of fluids are as their bulks, and their bulks in a ratio compounded of the bases and altitudes. Consequently, &c.

10. If an inclined vessel ABCD, fig. 5. have the same base and altitude with a perpendicular one, B E F G. the bottoms of the one and the other will be equally pressed.

For, in the inclined vessel ABCD, the bottom CD is pressed in the direction BD. But the force of gravity in the direction BD is to the absolute gravity, as BE to BD. Consequently, the bottom CD is pressed in the same manner, as if it had been pressed perpendicularly by the fluid under the altitude BE. Therefore, the bottoms of the perpendicular and inclined vessels are equally pressed.

11. Fluids press upon subjacent bodies, according to their perpendicular altitude, and not according to their latitude, or breadth.

Or, as others state it, thus: If a vessel be taper, or unequally big at top and bottom, yet the bottom will be pressed after the same manner as if the vessel were cylindrical, and the top and bottom equal.

Or thus: The pressure sustained by the bottom of a vessel, whatever the figure of the vessel be, is ever equal to the weight of a column of the fluid, whose base is the bottom itself, and height, the vertical distance of the upper surface of the water from the bottom.

Or, yet more explicitly, thus: If there be two tubes or vessels, having the same heights, and bases, both filled with water; but one of them made to taper upwards that it shall contain but twenty ounces of water; whereas the other, widening upwards, holds two hundred ounces; yet the bottoms of the two tubes shall sustain an equal pressure of water, viz. each of them at the weight of two hundred ounces.

This is a noble paradox in hydrostatics, first discovered by M. Paofchal, and which it well worth the clearing and infilling on. It is found unexceptionably true from actual experiments; and it may even be demonstrated and accounted for on principles of mechanics.

Suppose, e. g. the bottom of a vessel C D (fig. 6.) less than its top A B; since the fluid presses the bottom C D, which we suppose horizontal, in a perpendicular direction E G, but that part of the cylinder B C D F, can press upon its natural buoyancy and pressure of the water being taken off the sides.

Again, supposing the bottom C D (fig. 7.) much bigger than the top F G; or even for the water demonstrates, suppose a tube E F, fixed in a cylinder A B C D; and suppose the bottom C D raised to L, that the fluid may be moved through the interval D L; then will it have risen through the altitude G L, which is to D L, as the base C D to that of G E. The velocity, therefore, of the fluid E F is to its velocity in the vessel A D as the base C D to the base F G.

Hence we have the momentum wherewith the fluid in the tube tends downwards, by multiplying the base of the cylinder C D into its altitude C H.
FLUIDS.

Consequently the bottom C D is pressed with the same force, as it would be pressed by the cylinder H C D L.

To confirm and illustrate this doctrine of the pressure of fluids in the ratio of the base and altitude, provide a metallic vessel A C D B (fig. 7.) so contrived, as that the bottom C D may be moveable, and to that end fitted in the cavity of the vessel with a rim of wet leather, to slide freely without letting any water pass. For this purpose it would be most advisable, that the moveable bottom should have a groove round its edge, and that it be put into a bladder, tied close round it the groove by a strong waxen thread; and the bladder may be made to come up like a purse within the vessel, and put over the top of it at A and B all round, and then the lid of the vessel pressed on it: so that when water is poured through a hole in the lid, it would lie upon the bottom C D, and be contained within the bladder.

Then, through holes in the top A B, apply successively several tubes of equal altitudes, but of different diameters. Lastly, fastening a string or wire to the beam of a balance, and fixing the other end by a little ring K to the moveable bottom, put weights in the other scale, till they be sufficient to raise the bottom C D; then will you not only find, that the height is required, what diameter or magnitude ever the tube be of; but even, that the weight which will raise the bottom when pressed by the faulked tube, will raise it when pressed by the whole cylinder H C D L.

Suppose the vessel A B C D to hold about a pound of water, and that the moveable bottom, wire, and hook, are of equal weight with an empty scale M. When this scale is pulled down, the bottom C D will be drawn up within the box, and that motion will cause the water to rise in the glass tube E F G. If one pound be put into the scale, the bottom will be moved a little, and the water will just appear at the lower end of the tube at a. Another pound will cause it to rise from a to b, just twice as high above the bottom as it was when at a; the pressure of the bottom being equal to two pounds, the counterbalancing weight in the scale M. A third pound will raise it to c, a fourth to d, &c. the distances a b, b c, c d, &c. being taken equal to each other and to the depth of the vessel. If another tube, as /, be put into a hole made in the top of the vessel, and the vessel be filled with water; and, then, if water be poured in at the top of the tube F G E L, it will rise in the tube / to the same height as it does in the other tube: from hence it is evident, that the upward pressure of the water, rising in the tube /, is equal to the downward pressure in the other tube F G E L: the cafe would be the same, whatever be the number of tubes; and the moveable bottom would sustain the weight of the water in all the tubes, besides the weight of all the water in the vessel; and if all the holes to which these tubes (F G E L excepted) were fixed be stopped up, each part, thus stopped, will be pressed upward with a force equal to the weight of water in each tube: and consequently, the whole upward pressure against the top of the vessel, rising from the weight or downward pressure of the water in the tube F G E L, will be equal to the weight of a column of water of the same height with that in the tube, and of the same thickness as the width of the base of the box or of the moveable bottom; and this upward pressure against the top will reach downwards with equal force against the bottom.

If the diameter of the moveable bottom be three inches, the same, and the diameter of the bore of the tube a quarter of an inch, their squares will be nine inches and one sixteenth of an inch; and therefore the whole area of the bottom will be a hundred and forty-four times as great as that of the area of the bottom or top of the tube: so that if the moveable bottom be raised one inch, the water would be raised to the top of a tube a hundred and forty-four inches, or twelve feet in height. The vessel must be open below the moveable bottom, let it to the air; otherwise the pressure of the atmosphere upon it, supposing its diameter three inches, would require a counterbalancing of a hundred and eight pounds in the scale M before the bottom would begin to move. See Hydrostatic Bellows.

12. From the preceding articles, we may easily deduce a method of estimating the quantity of pressure of fluids on any given surface. Let a b c d (fig. 8.) represent a cubical vessel full of water; the side a c will therefore, represent a square; and the measure of the pressure on every physical point of a c will be the altitude of the water above that point; thus, the pressure on l is measured by a l, on m by a m, &c. and the pressure on the whole line will be measured by the sum of as many altitudes a l, a m, &c. as there are points in the line a c. Erect perpendiculars l b, m p, &c. respectively equal to a l, a m, &c. and the sum of these perpendiculars will be the measure of the whole pressure on the line a c: but the sum of these is equal to the area of the triangle a c d; and, when the line a c d is supposed to represent a square, the triangle a c d must represent a prism, having the said triangle for its base, and the side of the square for its altitude: the weight of that prism of water is, therefore, equal to the pressure made against the square, or side of the cube; which, as the prism is half the cube, is equal to half the weight of the whole water contained in the vessel; and as each side bears the same degree of pressure, all the four sides sustain four times half the weight, or twice the whole weight of the water; and because the bottom sustains a pressure equal to the whole weight of the water, the bottom and sides of a cubical vessel taken together sustain a pressure from the water contained in it equal to twice its weight. The fame observation may be easily applied to planes that are oblique to the horizon; and we may conclude universally, that the pressure upon any plane, of whatever figure and situation, is equivalent to the weight of a solid of water, formed by erecting perpendiculars upon every point of the plane proposed, equal to the respective distances of those points from the upper surface of the water; on the pressure on any surface is equal to the sum of all the products which are made by multiplying every indefinitely small part of the surface into its distance from the top of the water. To find the sum of all these products, or a body of water equal to that sum, is, in most cases, a difficult problem: Stevius has attempted the solution of it in few instances, confining himself to regular plain surfaces. Mr. Cotes has laid down the following universal and expedient rule: the pressure on any surface is equal to the weight of a body of water whose magnitude is found by multiplying the surface proposed into the depth of its centre of gravity under water; and the pressure on any number of surfaces of different bodies, however differently situated, is equal to the weight of a body of water whose magnitude is found by multiplying the sum of all those surfaces into the depth of their common centre of gravity under water. The determination of this rule depends on the following theorem, viz. that the force of its produce arising from multiplying every indefinitely small part of any surface, or number of surfaces, respectively, into its perpendicular distance from any proposed plane, will be equal to the product of the whole surface or number of surfaces multiplied into the perpendicular distance of the centre of
of gravity of any single surface, or of the common centre of gravity of the whole number of surfaces from the same plane. Thus, let \( a, b, c, d \) (fig. 9) represent weights, hanging at their centres of gravity \( a, b, c, d \), by the lines \( a, b, c, d, e, f, g, h \) fixed to a horizontal plane \( e, f, g, h \); and let \( z \) be the common centre of gravity of all the weights, and \( z \) its perpendicular distance from the said plane. Let \( x \) be the common centre of gravity of \( a, b, e \), and to \( x \), drawn parallel to the ref, let \( a x \) and \( b x \) be perpendicular. In the similar triangles \( m x a \), \( n x b \) and \( m x n x z : (x a : x b : i \cdot b : a \).

(See Center of Gravity.) Therefore \( ax + bx = b n x \); i.e. \[ \begin{align*}
ax + bx &= b n x \\
ax + bx &= x z + xo, \text{and, consequently, } ax + bx + xo &= n = a + b + x = a + b + x + xo.
\end{align*} \]

In the common centre of gravity of \( a, b \) suspend a weight \( x = a + b \), and a weight \( y = x + c \) in the common centre of gravity of \( x \) and \( c \), and a weight \( z = y + d \), in the common centre of gravity of \( y \) and \( d \). Then \( z \) is the common centre of gravity of \( a, b, c, d \). And we have (as above) \[ \begin{align*}
a x + a x + b x + b x &= b n x, \\
x x o + x c o = x y o, \text{and } x y o + d o = z x o, \text{ consequently, } a x + a x + b x + b x &= x z + xo, \\
and this will be the case, if the suspended lines \( a, c \) are perpendicular to any plane, though not parallel to the horizon. Now taking the upper surface of water for that plane to which we refer the indefinitely small parts of the surface which is exposed to the preffure we are concerned with; since it has been already shown, that the preffure upon the whole is equivalent to the weight of a body of water which is equal in magnitude to the sum of all the products, made by multiplying every little part by its distance from the upper plane of the water; and that this sum of products is exactly equal to the product of the whole surface or number of surfaces multiplied into the distance of the centre of gravity from the upper plane of the water; it will follow, that the same product is the measure of a magnitude of water, whose weight is equivalent to the preffure required. Cotes's Hydrost. Lect. 3. See Center of Preffure.

For the laws of the preffure and gravitation in fluids specifically heavier, or lighter, than the bodies immerged, see Gravity, Specific.

For the laws of the resistance of fluids, or the retardation of solid bodies moving in fluids, see Resistance.

For the ascent of fluids in capillary tubes, or between glafs planes, see Ascent and Capillary Tubes.

The motions of fluids, and particularly water, do also make the subjéct of Hydraulicæ, which see.

Fluids, Hydrostatic Laws of 1. The velocity of a fluid, as water, moved by the preffure of a superincumbent fluid, as air, is equal at equal depths, and unequal at unequal ones.

For the preffure being equal at equal depths, the velocity arising thence must be to one; and vice versa: yet the velocity does not follow the same proportion as the depth, notwithstanding that the preffure, whence the velocity arises, does increase in the proportion of the depth. But have the quantity of the matter is concerned in the quantity of motion, which is compounded of the ratio of the velocity and quantity of matter, is increased in equal times as the squares of the velocities.

2. The velocity of a fluid arising from the preffure of a superincumbent fluid, at any depth, is the same as that which a body would acquire in falling from a height equal to the depth: as is demonstrated both from mechanics and experiments. See Descent. See also Discharge of Fluids.

3. If two tubes of equal diameters, full of any fluid, be placed in any position, either erect, or inclined; provided they be of the same altitude, they will discharge equal quantities of the fluid in equal times.

That tubes, every way equal, shou'd, under the same circumstances, empty themselves equally, is evident; and that the bottom of a perpendicularly tube is preffed with the same force as that of an inclined one, when their altitudes are equal, ha's already been shewn. Whence it easily follows, that they must yield equal quantities of water, &c.

4. If two tubes of equal altitudes, but of unequal apertures, be kept confluently full of water, the quantities of water they yield in the same time will be as the diameters; and this, whether they be erect, or any way inclined.

Hence, if the apertures be circular, the quantities of water emptied in the same time, ought to be as a duplicate ratio of the diameter.

But this law, Mariotte observes, is not perfectly agreeable to experiment. If one diameter be double the other, the water flowing out of the less is found more than a fourth of what flows out of the greater. But this may have been owing to some accidental irregularities in making the experiments.

Voltaire however ascribes it principally to this, that the column of water directly over the aperture is shorter than that next the sides or parietes of the vessel: for the water, in its eflus, forms a kind of cavity over the aperture; that part immediately over it being evacuated first, and the other water not running fast enough from the sides to supply it. Now, this cavity, or diminution of altitude, being greater in the greater tube than in the less; hence the preffure, or endeavour to pass out becomes proportionally less in the greater tube than in the less.

5. If the apertures \( F \) of two tubes \( A, B \) and \( C, D \) (Hydraulics. Plate VI. fig. 1 and 2.) be equal, the quantities of water discharged in the same time will be as the velocities.

6. If two tubes have equal apertures \( E \) and \( F \), and unequal altitudes \( A, B \) and \( C, D \), the quantity of water discharged from the greater \( A, B \), will be to that discharged from \( C, D \), in the same time, in a subduplicate ratio of the altitudes \( A, B \) and \( C, D \).

Hence, 1. The altitudes of water, \( A, B \) and \( C, D \), discharged through equal apertures \( E \) and \( F \), will be in a duplicate ratio of the water discharged in the same time. And as the quantities of water are as the velocities, the velocities are likewise in a subduplicate ratio of their altitudes.

Hence, 2. The ratio of the water discharged by two tubes \( A, B \) and \( C, D \), together with the altitude of one of them, being given, we have a method of finding the altitude of the other, viz. by finding a fourth proportional to the three given quantities; which proportional, multiplied by itself, gives the altitudes of \( C, D \), required.

Hence, also, 3. The ratio of the altitudes of two tubes of equal apertures being given, as also the quantity of water discharged by one of them, we have a method of determining the quantity the other should discharge in the same time.

Thus, to the given altitudes, and the square of the quantity of water discharged at one aperture, find a fourth proportional. The square root of this will be the quantity of water required.

Suppose,
Support, e. gr. the height of the tubes as $9$ to $25$, and the quantity of water discharged at one of them, three inches; that discharged by the other will be $\sqrt{\frac{9^2 + 25^2}{9}} = \sqrt{\frac{81 + 625}{9}} = \sqrt{70.5} = 8.4$.

7. If the altitudes of two tubes $A$ and $C$ be unequal, and the apertures $E$ and $F$ be likewise unequal, the quantities of water discharged in the same time, will be in a ratio compounded of the simple ratio of the apertures, and the subduplicate one of the altitudes.

And hence, if the quantities of water discharged in the same time by two tubes, whose apertures and altitudes are unequal, be equal, the apertures are reciprocally as the roots of the altitudes, and the altitudes in a reciprocal ratio of the squares of the apertures.

8. If the altitudes of two tubes be equal, the water will flow out with equal velocity, however unequal the apertures be.

9. If the altitudes of two tubes, $A$ and $C$, as also their apertures, $E$ and $F$, be unequal, the velocities of the waters discharged are in a subduplicate ratio of their altitudes.

And hence, 1. As the velocities of waters flowing out at equal apertures, when the altitudes are unequal, are also in a subduplicate ratio of the altitudes, and as this ratio is equal if the altitudes be equal, it appears in the general, that the velocities of water flowing out of tubes, are in a subduplicate ratio of their altitudes.

Hence also, 2. The squares of the velocities are as the altitudes.

Mariotte found, from repeated experiments, that if a vessel $A$ $B$ $C$ $D$ have a tube $E$ $G$ fitted to it, there will more water be evacuated through the tube, than there could have been, in the same time, through the aperture of the vessel $E$ without the tube; and that the motion of the fluid is accelerated so much the more, as the tube $E$ $G$ is the longer.

E. gr. The altitude of a vessel $A$ $C$ being one foot, that of the tube $E$ $G$ three feet, and the diameter of the aperture three lines, no less than $\frac{41}{5}$ septiers of water were discharged in the space of one minute; whereas, upon taking off the tube, only four septiers were discharged.

Again, when the length of the tube $E$ $G$ was six feet, and the diameter of the aperture $G$ an inch, the whole quantity of water run out in thirty-six seconds; but cutting off half the tube, the vessel was not evacuated in less than forty-five seconds; and taking it quite away in less than fifty seconds.

10. The altitudes and apertures of two cylinders full of water being the same, one of them will discharge double the quantity of water discharged in the same time by the other, if both be kept continually full, while the other runs itself empty; for the velocity of the full vessel will be equally, and that of the other will be continually retarded. Now it is demonstrated, that, if two bodies be impelled by the same force, and the one projected equally, and the second equally retarded, by the time they have lost all their motion, the one has moved double the space of the other.

If two tubes have the same altitudes, and equal times wherein they will empty themselves, the squares of the altitudes are in the ratio of their rates.

Cylindrical and prismatic vessels, as $A$ $B$ $C$ $D$ (fig. 3), empty themselves by this law, that the quantities of water discharged in equal times decrease, according to the unities $1, \frac{1}{5}, \frac{1}{7}, \frac{1}{9}, \cdots$ taken backwards.

For the velocity of the descending liquid $F G$ is continually decreasing in the subduplicate ratio of the decreasing altitudes; but the velocity of a heavy body descending, increases in the subduplicate ratio of the increasing altitudes. The motion, therefore, of the liquid $F G$, in its descent from $G$ to $B$, is the same as if it were to descend in the inverse ratio of the altitudes; but if it descend from $B$ to $G$, the spaces, in equal times, would increase, according to the progression of the uneven numbers; consequently the altitudes of the level $F G$, in equal times, would decrease, according to the same progression inversely taken.

Hence, therefore, the level of water $F G$ descends by the same law, as, by an equal force impressed, it would ascend through an altitude equal to $B G$.

From this principle, many other particular laws of the motion of fluids might be demonstrated, which, for brevity sake, we here omit. See Discharge of Fluids.

To divide a cylindrical vessel into parts, which shall be evacuated in certain parts or divisions of time, see CLIPSIDRA.

13. If water, descending through a tube $H E$ (fig. 4.) spout up at the aperture $G$, whose direction is vertical, it will rise to the same altitude $G I$, at which the level of the vessel $L M$, in the vessel $A$ $B$ $C$ $D$, does stand.

For since the water is driven through the aperture $G$ by the force of gravity, if its velocity will be the same as that with which a body, by the same force impressed, would rise to the altitude $F I$; wherefore, since the direction of the aperture is vertical, the direction of the water spouting through it will be fo too; consequently the water must rise to the height of the level of the water $L M$ in the vessel.

Indeed, by the experiment, it appears, that the water does not rise quite so high as $I$: besides the aperture $G$ should be smaller, as the height of the level of the water is less; and even smaller when mercury is to be spouted than when water. But this is no objection to the truth of the theorem; it only shews that there are certain external impediments, which diminish the ascents.

Such are, the resistance of air, and the friction of the tube, &c. See Jet d'Eau.

14. Water, descending through an inclined tube, or a tube bent in any manner, will spout up, through a perpendicular aperture, to the height at which the level of the water in the vessel stands.

15. The lengths of spaces $D E$ and $D F$, or $I H$ and $I G$, (fig. 5.) to which water will spout either through an inclined, or an horizontal aperture $D$, are in a subduplicate ratio of the altitudes in the vessel or tube $A$ $B$ and $A$ $C$.

For since water, spouted out through the aperture $D$, endeavours to proceed in the horizontal line $D F$ and, at the same time, by the power of gravity, tends downwards in lines perpendicular to the same; nor can the one power hinder the other, inasmuch as the directions are not contrary; it follows, that the water, by the direction $D A$ will arrive at the line $1 G$ in the same time wherein it would have arrived at it, had there been no horizontal impulse at all. Now, the right lines $I H$ and $I G$ are the spaces which the same water would have described in the mean time by the horizontal impetus; but the spaces $I H$ and $I G$, inasmuch as the motion is uniform, are as the velocities; consequently the velocities are in a subduplicate ratio of the altitudes $A$ $B$ and $A$ $C$; and therefore the length or distances, to which the water will spout in apertures either horizontal or inclined, are in a subduplicate ratio of the altitudes.

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That the velocities are in the subduplicate ratio of the altitudes may be shown by experiment; for, let two pipes, as C and g, of equal fixed bores, be fixed into the side of the vessel A B (fig. 6.) and let the pipe g be four times as deep below the surface of the water at h, in the vessel, as the pipe C is; and whilst these pipes run, let the water be constantly poured into the vessel, to keep the surface at the same height. Then a vessel, holding a pint, applied to the spout C, and another containing a quart at the spout g, will be filled at the same time. The horizontal distance, to which a fluid will spout from an horizontal pipe, in any part of the side of an upright vessel, below the surface of the fluid, is equal to twice the length of a perpendicular to the side of the vessel, drawn from the mouth of the pipe to a semicircle described upon the altitude of the fluid; and therefore, the fluid will spout to the greatest distance possible from a pipe whose mouth is at the centre of the semicircle; because a perpendicular to its diameter (supposed parallel to the side of the vessel) drawn from that point, is the longest that can possibly be drawn from any part of the diameter to the circumference of the semicircle. Thus, if the vessel A B (fig. 6.) be full of water, the horizontal pipe D be in the middle of its side, and the semicircle N eded be described on D as a centre, with the radius D e N, or D f b, the perpendicular D d to the diameter D N b is the longest that can be drawn from any part of the diameter to the circumference N eded. And if the vessel be kept full, the jet G will spout from the pipe D to the horizontal distance N M, which is double the length of the perpendicular D d. If two other pipes, as C and e, be fixed into the side of the vessel at equal distances above and below the pipe D, the perpendiculars C e and e, from those pipes to the semicircle, will be equal; and the jets F and H, spouting from them, will each go to the horizontal distance N K, which is double the length of either of the equal perpendiculars C e or e.

Hence, as every body, projected either horizontally or obliquely, in an unresisting medium, describes a parabola; water projected either through a vertical or inclined spout, will describe a parabola.

Hence we have a way of making a delightful kind of water arbores, or arches, &c., by placing several inclined tubes in the same right line.

On these principles are formed various hydraulic engines for the razing, &c., of fluids, as pumps, syphons, fountains, or jets d'eau, &c., which see described under their proper articles. Pump, Syphon, Fountain, Spiral, Screw, &c. For other particulars relating to this subject, and the difference between the deductions of theory and the result of experiments; see Discharge of Fluids. See also Contracted Jet and Jet.

For the laws of the motion of fluids, by their own gravity, along open channels, &c., see River and Wave, and Motion of Water.

For the laws of pressure and motion of air, considered as a fluid, see Air and Wind.

Fluids. Animals observed in fluids are of divers kinds; some are flat, others cell-like, but the greater part of an oval figure. Leewenboock gives a description of a very unusual shaped creature, fixed in a little fishbath or scuttle, which was fastened to some of the small green weeds found in ditches full of water. Phil. Trans. N. 220. p. 160.

Wonders of all kinds, that have flood a while exposed to the air, till they have grown a little putrid, or where putrefaction has been promoted by the admixture of other matters, abound in variety of animals, having each their peculiar characters, sizes, figures, colour, and method of life, not to say uses. In a small drop of the discolorated surface of rain water, which had flood two months in a window, Dr. Harris observed four sorts of animals: the clear part of the drop presented two kinds, both very small; the dril of the figure of antic-eggs; there were in a continual brisk motion. The second more oblong, three times as long as broad were exceedingly numerous, but their motion slow.

In the thick part of the drop there were also two sorts of animals. The first of the cell-like, resembling those in vinegar, but very much smaller, and with their extremities more sharp. These would wriggle out into the clear part, and then suddenly betake themselves back again, and hide in the thick and muddy part of the drop, much like common cells in the water. The second sort resembled a large maggot, which would contract themselves into a spherical figure, and then stretch out again. The end of the tail appeared with a forceps, like that of an ear-wig. They might be plainly perceived to open and shut their mouths, from whence air-bubbles were in quantity discharged. The number of these was not above four or five. The same four kinds of animals he also found in many other drops of the same corrupted water. Animals in fluids are generally found at the top. In the lower parts of the water, Dr. Harris affirms he could never find any, unless when the liquid had been disturbed, and the surface shaken down, and mingled with the lower parts. Dr. Harris examined some rain-water that had flood uncovered a little while, but had not contracted any thick or discoloured fume. And here, where the water was clear, he could not find any animals at all; but a little thin white fume, that, like gas, began to appear in its surface, he found to be a congeries of exceeding small animals of different shapes and sizes, much like those produced by steeping barley in water. Viewing a small drop of the green surface of some puddle water, he found it altogether composed of animalcules of several shapes and magnitudes; the most remarkable were those which gave the water that green colour, and were oval creatures, whose middle part were of a greenish-yellow, but each end clear and transparent. They could contract and dilate themselves, tumble over and over many times together, and then shoot away like flies. Phil. Trans. N. 220. p. 255.

Dr. Harris looked on the surface of some mineral chalybeate water, which flood in a viol untill for about three weeks. In it he saw two kinds of animals, one exceeding small, and the other very large, which latter fort had on the tail something that looked like fins. There were but very few of either sort. Phil. Trans. N. 220. p. 257.

Animals in fluids are easily destroyed by only separating them a while from their element. Naturalists have even found shorter ways. A needle-point dipped in spirit of vitriol, and then immersed into a drop of pepper-water, readily kills all the animalcules, which, though before feasting about with great liveliness and activity, no sooner come within the influence of the acid particles, than they spread themselves, and tumble down to all appearance dead. The like may be done by a fewt of salt, only with this difference; that by the application of salt, animals seem to grow vertiginous, turning round and round till they fall down. Tincture of salt of tartar used in the same manner kills them still more readily; yet not so, Vol. XIV.
but there will be apparent marks of their being sick first and convulsed. Liks destroy them as fast as spirit of vitriol, and human blood, by virtue of the salt contained in it, produces the same effect. Urine, fack, and sugars, do not all destroy them, though not so fast; besides, that there is some diversity in their figures and appearances, as they receive their deaths from this poison or that. The point of a pin dipped in spiritus nitricus, as Dr. Harris supposes it, will other animals of this kind. Phil. Trans. N. 203. p. 836, seq. and N. 220, p. 256.

We find in the waters of our ditches many species of small animals, both of the crustaceous and tellacous kinds. The legs of the creatures are short, they resemble those of crabs and lobsters, but are of a much more curious structure, they are less than a small flea, but they seem all breeders, carrying spawn at their tails, or in two small bags, one hanging from each side. These bags are often seen broked, and the spawn is then found to consist of globules very large in proportion to the size of the creature. There is another sort besides these, as beautiful, but much smaller than they; this in shape more resembles the shrimp, and carries its spawn as the shrimp does. These kinds both seem only to have one eye, and that placed exactly in the middle of the fore-head, without the least trace of a dividing line; and they are often so transparent, that the motion of their bowels, and pulsation of their heart, may be seen. Baker's Microscope, p. 93.

All who are acquainted with the microscope, know very well that in water, in which the best glasses can discover no animated particle of matter, after a few grains of pepper, or a small fragment of a plant of almost any kind, has been some time in it, animals full of life and motion are produced, and those so numerous as to equal the fluid itself in quantity.

A small quantity of water taken from any ditch in the summer months, is found to be full of little worms, seeming in nothing so much as fire to differ from these microscopic animals. Nay, water, without these, exposed in open vessels in the summer months, will be always found, after a few days, to abound with multitudes of them, visible to the naked eye, and full of life and motion.

These, we know, by their future changes, are the fly-worms of the different species of gnats, tipulcs, and multitudes of the other fly-species, and we can easily det rmine, that they have owed their origin only to the eggs of the parent fly there deposited. Nay, a closer observation will at any time give ocular proof of this; as the flies may be seen laying their eggs there, and those eggs may be followed in all their changes to the fly again.

Why then are we to doubt but that the air abounds with other flies and animalcules, as minute as the worms in these fluids? and that these last are only the fly-worms of the former, which, after a proper time spent in that state, will suffer changes like those of the larger kinds, and become flies like those of the whole eggs they owed their origin? Vide Reaumur, Hist. Infect. vol. iv. p. 431.

The differently medicated liquors, made by the infusions of different plants, afford a proper matter for the worms of different species of these small flies; and there is no reason to doubt but among these some are viviparous, others oviparous, and to this may be in a great measure owing the different time taken up for the production of the insects in different fluids. Those which are a proper matter for the worms of the viviparous fly, may be soonest found full of them, as probably the liquor is no sooner in a

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plate to afford them a proper nourishment than their parents place them there: whereas those produced from the eggs of the little oviparous flies must, after the liquor is in a proper state, and they are deposited in it, in form of eggs, have a proper time to be hatched before they can appear alive.

It is easy to prove that the animals we find in these vegetable infusions were brought thither from some other place. It is not less easy to prove that they could not be in the matter infused, any more than in the fluid it is infused into.

Notwithstanding the fabulous accounts of salamanders, it is now well known, that no animal, large or small, can bear the force of fire for any considerable time; and by parity of reason we are not to believe that any insect, or embryo insect, in any state, can bear the heat of boiling water for many minutes. To proceed to enquiries on this foundation, if several tubes filled with water with a small quantity of vegetable matter, such as pepper, oak bark, truffles, &c. in which, after a time, insect is well discovered by the microscope; and other like tubes be filled with simple water boiled, with water and pepper boiled together, and with water with the two other ingredients, all separately boiled in it; when all these liquors come to a proper time for the observation of the microscope, all, as well those which have been boiled as those which have not, will be found equally to abound with insects, and those of the same kind in the infusions of the same kind, whether boiled or not boiled.

Those in the infusions which had sustained a heat capable of destroying animal life, must therefore not have subsisted either in the water, or in the matters put into it, but must have been brought thither, after boiling, and it seems by no way so probable, as by means of some little winged inhabitants of the air depositing their eggs or worms in those fluids.

It is a natural question on this to ask, why it is, that whilst we see myriads of the progeny of these winged insects in water, we seldom see the insects themselves? The answer is equally easy, viz., because we can always place a drop of this water immediately before the focus of the microscope, and keep it there while we at leisure examine its contents; but that is not the case with regard to the air inhabited by the parent flies of these our worms, which is of immense extent in proportion to the water proper to nourish these worms, and consequently, while the latter are clustered together in heaps, the former may be dispersed and scattered. Nor do we want influence of this even in the insects of a larger kind. In many of our gardens we frequently find vessels of water filled with the grat-worms, as plentifully in proportion to their size, as these our fluids with animalcules. Every cubic inch of water in these vessels contains many hundreds of these animals; yet we see many cubic inches of the air in the garden not affording any one of the parent flies. Id. loc. comm. 256.

See ANIMALCULES, EEL, VINEGAR, and PEPPER-WATER.

FLUID. Gaufie. See CAUSTIC FLUID.

FLUID, SENSITIVE. See SENSITIVE FLUID.

FLUKE. in Ichthyology, a word used in some parts of England as a name for the flounder. See Anchor.

FLUKE, WORM, a sort of small flat worm, often found in the livers of sheep which have died of the rot. See Rot.
FLUMARI, in Geography, a town of Naples, in Principato Ultra; 21 miles S. E. of Ariano.

FLUMET, a town of France, in the department of Mont Blanc, seated on the Arly; 31 miles S. E. of Geneva.

FLUMMERY, a wholesome sort of vegetable jelly made of oatmeal.

The manner of preparing it is as follows: put in the proportion a three large handfuls of finely ground oatmeal, to steep for twenty-four hours or more, in two quarts of water; then pour off the clear water, and put two quarts of fresh water to it; strain it through a fine hair-net, and boil till it is as thick as a thin pudding, skimming it continually while it is boiling, so that it may be very smooth; some sweeten it with sugar, and add rose or orange-flower-water; and then eat it with white or Rhenish wine, cream, or milk.

FLUMS, in Geography, a town of Switzerland, in the county of Sargans, situated on the Mat; 3 miles W. of Seergans.

FLUOR, in Physics, &c. denotes a fluid; or, more properly, the state of a body, which, before hard and solid, but is now reduced by fume of fire, into a state of fluidity.

Gold and silver will remain a long time in flour, maintained by the intense heat, without losing anything of their weight. See Gold, Fertility, &c.

The word flour is applied to signify the habitual fluidity of any substance, or that property by which a substance cannot be rendered solid, and is employed as an epithet to distinguish such substances from others of the same kind, but which are habitually solid, or which may be rendered solid.

FLUOR, in Mineralogy, a species of the calcareous genus, being a combination of lime and fluoric acid, and known by the chemical appellation of FLUOR of lime. The more familiar names under which it passes in most countries are STONE and flower, denoting the use to which it is frequently applied as a flux of various ores. Besides these, there are a variety of other names that have originated in the similarity of its colours, (particularly those of the flourspar,) to the beautiful tints of several of the flowers called precious, such as topaz, topazes, kryz, eborulates, &c. Indeed there is no mineral that may equal flour in the varied beauty of its hues; the suit of its colours is almost sufficiently comprehensive to be formed into a chromatic scale. It is reserved for nicer chemical observation to discover the nature of this variously modified colouring principle, which is more fugacious in flour than in most other minerals, but probably always corresponding with the nature of the metallic substances that accompany flour in the bowels of the earth.

Flour has been divided by Werner into three sub-species, namely, earthy, compact, and saphiro flour. The first, 2100 known by the name of the phosphorescent earth of Marma-rosa, was clasped with the greenish earth by the authority of Pelletier; but the late analytical experiments of Klaproth, who found 32 parts of phosphoric to two of fluoric acid, showed the necessity of redating it to the phosphates of lime, to which it was first referred! Mr. Jamison appears to have had his doubts respecting this substance; he does not describe it as a sub-species of flour, nor does he enumerate it among the phosphates of lime. See PHOSPHORITE.

1. Compact flour. This is rather better understood; but it appears that mineralogists are very apt to confound the terms "compacta" and "malleous" also in speaking of flour: whereas malleous flour (spar has been described as Werner's compact flour. This latter occurs but rarely, having hitherto been found only at Stollberg and Strasburg in the Harz, and at Yttrum and Norberg in Sweden, to which habitus we may perhaps add Schlickerswald and Kirman in the Satz circle of Bohemia, and Schwarzeberg in Salzburg. The following external characters appear the most imporant:

Its colour is generally light grey, green, passing sometimes into greenish-white, sometimes into brownish-grey, approaching to yellow or green, and it is the found reddish. Not seldom several of these flours are mixed in spots in one and the same fragment, now and then with the addition of accidental yellowish and brownish spots.

It occurs malleous only. Fracture more or less even, approaching sometimes to flat conchoidal, sometimes to sphyntery, even to foliated. The fragments are indeterminately angular with pretty sharp edges, and more or less translucent in the same piece.

Its is feebly glittering, almost dull. Half-hard, scarcely scratched by fluor spar, brittle, entirely fragile. Its specific gravity, if Kirman's compact flour be the name as the one here described, is 3.120 to 3.165.

This sub-species, to a superficial observer, appears sometimes like horn-flour, sometimes like compact lime-stone; but the above external characters (to which may be added the physical one of its showing a weak phosphorescence when laid on ignited coal) keep it sufficiently distinct. Its geographical situation has been given above. Its geographical situation at Stollberg is in a vein, in greywacke; it is found with flour spar (its conlantine companion), fian copper pyrites and barytes. At Kirman in Bohemia it was found by Dr. Reuss in gneiss, in which it is sometimes seen as thin laminae between the layers of quartz and feldspar.

It is, together with flour spar, made use of as a flux.

2. The sparry flour, or flour spar, which, besides the above-mentioned general names, is also known under those of calcium flour, glass flour, phosphoroscent spar, spathites, &c.

Its principal colours are: 1. White, such as greyish, greenish, yellowish, and reddish-white, passing into 2. Red, particularly rote red of various intensity, carmine. 3. Grey, greenish, yellowish, smoke, and pearl-grey. 4. Blue, lavender, azure, smalt, sky-blue, Prussian and violet-blue, the two latter appearing sometimes nearly black. 5. Green, verdigris, faurado, mountain, emerald, grape-apple, leek, pythius, and olive green. 6. Yellow, wine, wax, honey-yellow. 7. Brown, yellowish, and clove-brown. All these colours will frequently pafs into each other, and even their shades related to each other are sometimes seen together in the same specimens in spots, and flakes, and in drapes that often appear like some kinds of alabaster, whence Roman de Pile called a variety of flour, albatrosites. The colouring matter of some of them is very fugacious, especially that of the sky-blue variety, which is often seen to fade merely by being exposed to the atmospheric air. Of the above colours, the white and violet blue are the most common.

Flour spar is found malleous and crystallized, and not commonly crystallized, but it has not been observed, except in one mine, to be malleous thence, in the 'magnetic shapes, (such as deutetform, branched, talcistanite.

4 S 2 &c.
FLUOR.

&c.), in which the carbonates and sulphates of lime, and other crystallizable earthy substances so frequently occur.

Its primitive form is the octaedron. As to the determination of the integral molecule some difficulty has arisen. The octaedron, we know, cannot be sub-divided into solids of the same form; the last term of mechanical division we arrive at is that into other octaedrons accompanied by tetraedrons; six of the former and eight of the latter being disposed in such a manner as to form in all directions acute rhomboheds. If we imagine either all the octaedral or all the tetraedral particles removed, those of the same kind that remain will still be in exact connection by means of their edges. Of the latter circumstance Haiy's has ingeniously availed himself to reconcile this resolution of the octaedral crystal into two kinds of solids, with that principle according to which all the integral molecules of a crystal must be necessarily similar. He supposes that, could we call a look into the primary constitution of the octaedral crystal, and sub-divide it to the utmost limits, we should find the whole sub-divided pervaded either by tetraedral or octaedral vacuities; if the former, the whole would be composed of octaedral elementary particles; if the latter, the tetraedron would exclusively constitute the integral molecule. Now, as, according to Haiy's doctrine, this molecule is constantly either the parallelo-piped, or the triangular prism, or the tetraedron, analogy has in this case decided in favour of the tetraedron, which is now considered as the integral molecule of fluorspar, instead of the octaedron. It was Werner who first observed the tetraedral and octaedral fragments which result (according to his terminology) from the fourfold cleavage presented by the foliated fracture of fluorspar.

The principal forms of the crystals of fluorspar, with their modifications, considered, not according to their origin, but to the manner in which they present themselves to the eye, are the following:

1. The perfect cube (chaux fluente cubique, Haiy.) It is sometimes elongated; passing from the cubic form into that of a rectangular four-sided prism, generally with two of its lateral planes narrower. We have seen specimens of this latter variety from Cumberland; it is also found at Schniititz and Nettiehau.

2. Cube with all the edges truncated (chaux fluante cube-dodecaedre, Haiy).

3. The preceding with planes of truncation so much increased that the rhomboidal or garnet-dodecaedron is formed (chaux fluante dodecaedre, Haiy).

4. Cube with all its edges bevilled (chaux fluante bordée, Haiy).

5. The preceding, with bevilling edges so much enlarged as to convert each plane of the cube into four triangular planes (chaux fluante hexoctaedre, Haiy). What has been described as perfect cube with convex planes, we suppose to be this modification indifferently formed.

6. Cube with all its solid angles flatly acuminated by three planes, placed on the lateral planes of the cube.

7. Cube having its angles acuminated by four planes, placed on the lateral planes. We do not know where the preceding and this variety occur; Emmelringer informs us, that in the latter the fix acuminating planes sometimes completely englobe the planes of the cube.

8. The cube truncated at all its solid angles (chaux fluante cube-octaedre, Haiy). If the triangular truncating planes do not meet, the planes of the cubes are octagons; if they meet exactly, those planes are squares; if all the truncating planes encroach on each other they become hexagons, while the planes of the cubes remain squares; when they encroach still more the

9. Octaedron, with fix truncated angles, is formed; in which the truncating planes are the fix planes of the cube; in the same manner as the truncations at the eight angles of the cube N° 8. are the eight planes of the octaedron. When the truncating planes of the modification N° 8. enlarge so much as to caufe the faces of the cube entirely to disappear.

10. The perfect octaedron, or double four-sided pyramid, is formed (chaux fluante primitiva, Haiy.)

11. Octaedron with truncated edges (chaux fluante emerginata, Haiy.)

12. Octaedron with both angles and edges truncated.

13. The elongated octaedron with four broader and four narrower planes, terminating in a ridge.

No. 1. is by far the most common of all the modifications of crystallized fluorspar. No. 3. is very rarely met with; it was found by M. Subrin between Brueil and Charecy on the way to Chalons. Of No. 4. the most interesting varieties occur in Cornwall. From the geometrical figure in plate 73. of that useful work "British Mineralogy," it appears, that Haiy's chaux fluente bordée occurs in Cornwall, with the eight angles truncated, parallel to the octaedron, by which a crystal of 38 faces is formed. Of No. 12, the perfect octaedron, the most beautiful variety is the rosecoloured one, found in the neighbourhood of Mont-Blanc. It also occurs in beautiful crystals in England, on Mount St. Gothard &c. and Mr. Sowerby is, we suppose, the first who has noticed the small violet variety of this modification found in Aberdeenhire.

To the above may perhaps in future be added the following unusual modifications. 1. The tetraedron with faintly truncated edges, mentioned by Mr. Muls as existing in the collection of Mr. Vonder Null; the truncating planes are flat to correspond to those of the cube. 

2. The rhomboid (one of the forms which fragments of fluorspar frequently exhibit, and which may be considered as an octaedron, with two tetraedrons applied to two of its opposite planes) is said to have been found as crystal. The third, mentioned by Emmelringer, is the double eight-sided pyramid, acuminated at both extremities by three planes placed on the alternate lateral edges. It is said to have been found in Saxony, and is in the collection of Count Wirna at Vienna.

The crystals of fluor spar are of various size; the perfect cubic is seen from five inches square to extremely minute, and scarcely distinguishable. They are found distinct and aggregated in various directions; sometimes globularly aggregated. Their surface is generally smooth and splendid; but sometimes perfectly dull. They are not seldom covered by an opaque crust of various colours, particularly blue or green; often they are drusy, and sometimes ornamented with a beautiful golden and pavonine tints: of which latter we have a fine specimen before us. Internal luster splendid, sometimes simply shining, according to the various degrees of perfection of the foliated fracture; it is vitreous, rather inclining to pearly; in some varieties even an adamantine luster has been observed.

Fracture more or less perfectly foliated, almost always straight, seldom curved-foliated, sometimes approaching to vitreous; it presents a four-fold equiaangular cleavage. The
FLUOR.

The form of the fragments has been mentioned in speaking of the integrant molecules. The massive is generally seen in granular distinct concretions of various bignesses; and sometimes it appears in columnar concretions, and radiated, interstratified by curved lamellar distinct concretions.

Degree of transparency according to the differences in the colour and fracture; some varieties, particularly the white or colourless, perfectly transparent; others entirely opaque; most commonly it is semi-transparent.

Its hardness is greater than that of calcareous spar; but it is scratched by iron; it is brittle, easily frangible, and not very heavy; its specific gravity is:

3.092 (from Stollberg) { 3.148 (from Freiberg) 4.
3.156 to 3.184. Muskau-brecc.
3.175 (the green var.) Blumenbach.
3.200 to 3.700. Gerhard.

Other physical characters are its phosphorescence when laid on ignited coal; the sky and violet blue and green varieties have been observed to emit the most vivid phosphoric light. The variety from Siberia, called chlorophane, when put on ignited coal, does not decrepitate, but emits a beautiful emerald green light, which has procured it its name. A flight of phosphorescence is likewise observed when two fragments are rubbed against each other in the dark.

As chemical characters of fluor-spar, we have to mention its deprecation before the blow-pipe, (which, however, is not the case with the Siberian chlorophane,) and subsequent loss of colour, and its melting, (particularly with addition of borax or phosphoric acid,) into a greyish white emanant; as also its emitting suffocating white vapours (fluoric acid) when acted upon by sulphuric acid.

The constituent part of fluor-spar, according to Sisold, the celebrated discoverer of a peculiar acid in this mineral, were stated to be:

Lime 57
Fluoric acid 16
Water 27

After him, Wenzel, Richter, and but lately Klaproth, have analysed this substance, and obtained the following results:

Fluoric acid 32.3
Calcareous earth 50.3
Iron and alum earth 10.3

100 Wenzel, 1783

Fluoric acid 55
Calcareous earth 65

100 Richter, 1785.

Fluoric acid 67.75
Calcareous earth 52.25

100 Klaproth, 1807.

With regard to the geographical situation of fluor-spar much is left to future observation. We know, however, that it does not only occur in veins, but likewise as beds in mountains of older formation. In Derbyshire it appears to form large irregular depositions in jet-like line, and also in Thuringia and at Zinnwald in Bohemia it occurs in beds. More frequently it is met with in veins of different relative ages, accompanied with several important metallic formations. The oldest, consisting principally of tin fluorspar, occurs at Zinnwald, and in other parts of the Bohemian and Saxony Erzgebirge; and a vein formation, equally old, is found in Switzerland, where the veins consist of fluor spar, feldspar, rock crystal, &c. The second in antiquity appears to be that which, accompanied with lead and silver ores, and sometimes with barytes, forms the substance of veins at Freiberg and other parts of the Saxony Erzgebirge, and also partly in Derbyshire. A third vein formation, found in the lower parts of the Hartz, consists chiefly of fluor spar with copper and iron pyrites, galena, sulphide iron, &c. The different ages of the venigenous fluor spar have first been examined into by Werner. We should also mention here that the variety of rock called chlorophane is found in a granitic rock in Siberia; and Andrada speaks of a variety he saw in Sweden (in the district of Norberg) mixed in large masses with mica flake.

A list of localities of fluor-spar may be found in all books on mineralogy; indeed, it is met with in most parts of Europe, though in some it is found in no considerable quantity. England and Saxony are the principal native places of this interesting mineral substance. In Scotland it is very scarce; the only localities known to Mr. Jameson are Aberdeen-firth and the Shetland islands. We know of no specimens from any part of America or Africa; in the northern parts of Asia, Patria found it in small quantities in two mines, viz. in the silver mine of Zmeof, in the Atlas mountains, where it occurs mixed with the other vein materials; in the lead mine in Dauria, near the river Amur, where it found it in small cavities of the vein stone, in the shape of a thick botryoidal crust.

The uses to which fluor-spar is applied, though not manifold, are not unimportant. The cheaper kinds are used as fluxes to metallic ores, particularly copper, iron, and silver. Chemists obtain fluoric acid from it. The use of it in this country, (particularly of the variety called blue jack by the Derbyshire miners,) for ornamental vases, columns, &c., is generally known. Mr. Mawe, in his "Mineralogy of Derbyshire," has given an account of the mode of working it. Several attempts have been made in France to manufacture the fluor spar of Auvergne into similar articles of ornament; but it appears as if the nature of its fracture renders it less fit for the lathe.

Fluoric smerc is seldom seen to constitute the substance of organic remains. We find influences of this concretion mentioned in Mr. Martin's "Outlines," the remains are chiefly those of retrochitae. Allo Dr. Kidd, in his "Outlines, &c." describes a bivalve shell in the Oxford collection, converted into fluor spar with imperfect crystals of nearly colourless fluor in the interior.

We should not omit mentioning in this place those corroded cubic crystals of fluor spar, of a yellowish-grey colour, found near the surface of the earth in some parts of Derbyshire: their texture is more or less porous throughout. Halé, who calls this variety chauss fluorspar aluminiferous, thinks that the ferruginous clay which it is laid to contain has the same relation to the fluor spar which the quartz grains have to the carbonate of lime in the crytalized lodestone of Fontainebleau. But this analogy does not appear to be founded in reality (See Sandstone.) Dr. Kidd concludes that the corroded appearance of these crystals may have been produced by some form of time.

Fluoric spar sometimes exhibits traces of decompositions. The singular variety from Boermalton, Devonshire, is octahedral crystals of a pale salmon green colour, and caked, as it were, in one another, is encrusted with a white earthy substance, which, if we may judge from the gradual transitions
transition into the perfect sublimate observable in a specimen before us, can only be the result of a disintegration of the constituent parts. Mr. Sowerby has given a good figure of this variety. It is probable that much of the sublimate described as earthy fluor is nothing but fluor in a decomposed state.

Fluorspar, in Minera, a colourless discharget from the female vagina, popularly termed the vitrioli, and by the schoolmen lavericles, an application of the same figuration, derived from the Greek. See Lecorrhrea.

FLUORIC Acid, in Glaebuli. This acid was discovered by Scheele more than thirty years ago, and the sub-fec spum of the diamonds, from being the first to be detected, it has also been found in the animal kingdom, viz. in the enamel of the pettish teeth of an elephant; also in the enamel of the human teeth, and ivory.

We have seen that the constituent parts of fluor spar, independently of the water in combination, are fluoric acid and lime. To obtain this acid we must put one part by weight of the spar coarsely powdered into a leaden retort, and pour over it three parts of concentrated sulphuric acid. An effervescence is immediately excited; the sulphuree acid exerting a stronger attraction for the lime of the spar, unites with it, and the fluoric acid goes off in the form of gas, which may be collected in receivers over mercury.

When water had been previously introduced into the receiver, the gas would have been absorbed, and the acid would, in that case, be exhibited in the liquid state. Hence fluoric acid can sublimate in the liquid form, and likewise under that of gas, which has the common properties of the atmospheric air, being elastic and invisible. But it is somewhat heavier than common air; it extinguishes combustion, and is utterly incapable of supporting animal life. Exposed to the atmosphere it combines very greedily with its moisture, and appears in the form of vapour or white fumes. It has a penetrating pungent smell; reddens vegetable blues, and corrodes the skin. If a lighted candle be introduced into it, the flame becomes green, and then is extinguished.

The most remarkable property of the fluoric acid gas is that of corroding glass in consequence of its strong affinity for glass. This property has rendered it extremely useful in etching or engraving on glass vessels, which operation is performed by a very simple and easy process: the glass is covered with wax, or a strong solution of tinctures, the figures are then traced with a common graver, or steel point, and then the vessel is exposed to the action of the fluoric acid in a flat of gas; those parts that are exposed are soon corroded, and the impression is more or less deep, according to the time employed. This art, though adopted as new at the time of Scheele's and Priestley's discoveries, was, according to the account given by Beckman in the second volume of his History of Inventions, known and practiced a century before.

Light and caloric have no effect on fluoric acid; its properties are not the least altered by being passed through a red-hot porcelain tube. It will not unite with oxygen, which is the great difficulty that exists between this and the muriatic acid. Air has no action on azote, hydrogen, carbon, phosphorus, or sulphur. By these, or by some of them, almost all the other acids have been decomposed, and their constituents detected, and hence its base was, till very lately, wholly unknown; and it was, from analogy only, that chemists assumed that it must contain oxygen in combination with an unknown base. Mr. Davy has, however, thrown some light on this subject, by subjecting the fluoric acid-gas to the action of potash, one of his newly discovered metals. In this gas potash, when heated, burns, and there is a great absorption of the gas. Either the whole, or part of the acid, according to the quantity of the potash used, is destroyed or absorbed, and the residual elastic fluid is found to be hydrogen, which is in less proportion as the fluoric acid gas has been more perfectly freed from water. After the combustion, a chocolate coloured mass remains at the bottom of the retort, and also a sublimate, partly chocolate coloured, and partly yellow, is found about the sides, and at the top of the retort. This sublimate, when examined by a magnifier, appeared to consist of different kinds of matter; and when thrown into water it effervesced very violently, and the gas evolved was inflammable. When heated in contact with air it burnt slowly, lost its brown colour, and became a white false sublimate.

The water which had acted on this sublimate was examined, the solid particles separated by a filter, and the filtrate was found to contain a mixture of potash and pot-spar. The solid residuum was heated in oxygen gas, it burnt before it came to a red heat. The brown colour was changed to white; oxygen was absorbed, and acid matter was produced. The inflammable sublimate thus produced from the action of potash on the fluoric acid is supposed to be the base of the acid. Perhaps the decomposition of the fluoric acid by potash is analogous to that of the sulphuric and phosphoric acids; in which the base ates is not evolved, nor even the bases in their common form, but new compounds formed of the base with potash, with a smaller proportion of oxygen. This subject has engaged also the attention of the French chemists, M. M. Gay Lussiac and Thenard, who employed the agency of potash, and the results of their investigations were very similar to those of Mr. Davy. From which we infer that since little or no hydrogen gas is evolved in the combustion of potash, the effect cannot be ascribed to the agency of water. The acid must therefore be decomposed, or it must combine undecomposed with the metallic base, which is not even oxidated. It is probable, therefore, that the acid is decomposed, and the product is a combination of the fluoric base with potash, analogous in constitution to a phlogurture.

Fluoric acid combines with alkalies and earths, and the salts so formed are named fluorites. They are generally deliquescent, and can be crystallized with difficulty. They are decomposed by the sulphuric or muriatic acid, which, as we have seen, dissolves the fluoric. The alkaline fluorites are decomposed also by lime, as is evident by the following table.

Table of Affinities,

| Lime | Barites | Strontites | Magnesia | Potash | Soda | Ammonia | Glucina | Albunus | Zoncon | Schea |

The fusing power of this acid exceeds that of all the others.
others, a given quantity of it saturating a larger quantity of any base. On this account, it is regarded as the most powerful of the acids, and its felsic energy must be attributed partly to the weak state of concentration in which it can be obtained, and partly to its not affording oxygen in a direct way.

There are eight fluates known, viz. of pot-ash, soda, ammonia, lime, barytes, magnesia, alumine, and silica. Some of these we shall briefly notice. The fulate of pot-ash is obtained by fusing in a platina crucible, a mixture of fluor spar, and carbonate of pot-ash. The mass, digested in water, yields a solution, which, filtered and evaporated, leaves a fulate of pot-ash. It does not crystallize, but forms a gelatinous mass with scarcely any taste, that attracts moisture from the air. It readily dissolves in water.

F. of soda is formed like the last; if the solution is evaporated till a pellicle forms on its surface, it yields anBS6 small cubical crystals of fulate of soda. These are bitter and aromatic; they do not deliquesce in the air, and are but little soluble in water. They decrystallize and melt into a transparent globule when exposed to the action of the blow-pipe. F. of ammonia is obtained by the application of heat to a mixture of sulphate of ammonia and fluor spar. The fluates sublimes; but if it is prepared by fusing the acid with ammonia, the solution, by evaporation, yields small crystals of fulate of ammonia. F. of lime is the fluor spar on which we have already treated; as it is found in nature, this salt may be artificially prepared by adding fluates of ammonia to nitrate of lime; the fluate of lime falls to the bottom, and when properly treated is very pure. It is insoluble in water, phosphoric acid when laid on a hot iron, is in its nitrate, unalterable by exposure to the air, and at a heat equal to 51°F of Wedgwood, it melts into a colourless transparent glass. Fluoric acid obtained in glas vessels always contains a portion of silica; if this solution is allowed to remain a considerable time in a vessel not quite closed, it deposits small brilliant transparent crystals, which have been ascertained to be the fluate of silica. This salt is soluble in alkalies, and gives out fluoric acid by mere heat, or by the action of any of the strong mineral acids. Felspar, and all minerals that contain silica, are probably acted on without difficulty by the fluoric acid in a state of gas, but those that contain no alkali are least liable to its action. The following table, taken from Dr. Thomson's chemistry, vol. ii. exhibits the results of the experiments and calculations of Richter on the several fluates.

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<th>Table of the Composition of the Fluates.</th>
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<td>Fluates of</td>
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<td>Acid</td>
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</tr>
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<td>186</td>
<td></td>
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<tr>
<td>Soda</td>
<td>100</td>
<td>201</td>
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<td>Strontian</td>
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<td>Pot-ash</td>
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<td>Barytes</td>
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<td>520</td>
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FLURRY-Brige, in Geography, a small post-town of Ireland, in the county of Louth, on the borders of Armagh.

FLUSH, signifies to draw off, or let go a stream of water from any period.

FLUST. Deo. De Creek.

FLUSHER, in Ornithology, the common name of the better butcher-bird, called by authors the lanius minor, and the lanius tertius of Aldrovand. See Lanius Cullu-rio.
thee creatures is in general white, and in the night-time, or when placed in the dark, they occasionally emit a phosphorescent light.

Species.

**Truncata.** Foliacese, sub-divided, with linear truncated sub-divisions. Müll.

Native of the European seas, and five inches in length; cells oblong-square, and pale yellow-brown.


Inhabits European and Mediterranean seas, six inches long; colour yellow-brown.

**Filoza.** Foliacese, variously branched, with a fe- tacous ciliate on the lower part of each pore. Müll.—*Allelopura membranacea plana, punctis quincuncialibus,* A. Moen. Acad.

Whitish, porous, incrusting marine plants; and inhabits European seas.

**Carbasea.** Foliacese, sub-divided, with a single layer of cells. Ellis.

Yellow-brown. Inhabits the coast of Scotland.

**Characea.** Papparaceus, with cells on both sides, the tops of the branches truncated, like the edge of an axe. Ellis.

Adheres to shells, and of a pale straw colour; native of Europe.

**Bombycina.** Frondescent, with obtuse branches, divided into two or three parts, growing together in tufts, forming forth small radical tubes, and having a single layer of cells. Soland.

Inhabits the Bahama islands.

**Verticillata.** Parastallic, with flattish linear branches, narrower at the base, and rows of top-shaped ciliated cells disposed in whorls one above another. Soland.

Native of the Mediterranean.

**Dentata.** Parastallic, foliacose, with thinning oval cells in a single layer, the mouth surrounded by sharp inflected teeth. Ellis.

On fuci, and inhabits the European seas.

**Bullata.** Parastallic, with ovate projecting white cells, the mouths of which are round, and armed with small spines. Ellis.

Found in the European seas adhering to fuci.

**Tomentosa.** Parastallic, soft, woolly, with invisible cells. Müll.

Inhabits the North and Baltic seas.

**Denticulata.** Parastallic, with oval distinct cells, three-toothed at the opposite margin, and the mouth margined. Müll.

Inhabits the North seas, on fuc I and shells.

**Turbita.** Parastallic, membranaceous, with single oblong-ovate cells, and tubular erect mouths. Soland.

Deep yellowish, semi-transparent, and adheres to fuci; found in the seas of St. Domingo.

**Hispa.** Frondescent, spongy, the fronds branched and mucilaged on the upper side with very rough belts. Pallas.

About an inch long, of a pale grey colour, and extremely rare. The species inhabits the Mediterranean sea.

**Frondiculosa.** Frondescent, with obtuse crowded branches thrice divided, and a single layer of cells. Seba, Pallas, &c.

Native of the Indian ocean.

**Pappacea.** Frondosceous, frondescent, with a manycleft finely lamellate frond; cells oblong-ovate, and ringlet at the top. Pallas.

Yellowish and rough on the surface. Inhabits the Mediterranean.

**Hirta.** Parastallic, flat, coriaceous, with contracted distal cells. *Fiohra bipi~ida,* Fabr. Fin. Grouw.

Fuscous with narrow cells, adhering to fuci, in the Greenland seas.

**Membranacea.** Parastallic, membranaceous, with oblong-quadangular cells pointed at the upper projecting angles. Soland.

Inhabits the British and North seas.

**Lineata.** Parastallic, flat, foliacose, undivided, with oval cells in transverse rows. Fabr. Fin. Grouw.

Found on fuci in the North seas.

The fruticosa are no of Gmelin is excluded, as it cannot be considered of this genus; it is an escorial of Pallas, and millipora of Ellis.

**FLUT, in Geography, a river of Bohemia, which runs into the Egro, opposite to Libeshein.

**FLUTA, in Ichthyology, a name given by Gara and some authors to the common thars, distinguished by Arctedi by the name of the plain yellow thars, with a large annular black spot near the tail. See *Parus Annulatus.*

**FLUTA** is also a name given by Columbus to the murana of Aritcle and the ancient authors in general, as well Greek as Roman. It makes only one species of the murana, according to Arctedi; but being with him a general name which comprehends all the ech-kynds, the serpens marinus and the like, among them. This, which was anciently called simply the murana is distinguished by that author under the name of the murana having no pectoral fins; which being peculiar to this species, evidently and obviously distinguishes it at first sight from all the red. See *Murana.*

**FLUTE, an instrument of music, the simplest of all those of the wind-kynd; played, by blowing it with the mouth; and the tones or notes formed and changed by flapping or opening holes disposed for that purpose all along it. Those of common use are either the flute after, i.e. a beaked or common English flute, and the traverse, Helvetian, or German flute, the invention of which is ascribed by Galileo and Merfunne to the Helvetians; but the antique flute of the piping faun, and a telescoped pavement of Fortuna Virili, erected by Sylla at Rome, in which is a representation of a young man playing on a traverse pipe, with an aperture to receive his breath, shaw that it is of more ancient original.

The Latin call it *floutas,* and sometimes *tibias,* pipe; from the former of which some derive the word flute; though Borel will have it derived from *flouta,* a lamprey, thus called a *fluvium in fluvius,* in regard the flute is long, like the lamprey; and has seven holes all along it, like that fish. Grallinian.

The ancient fialtw, or flutes, were made of reeds; afterwards they were of wood; and at length of metal. But how they were blown, whether as our flutes, or hautboys, does not appear.

Mons. Cassillon apprehends that they were founded by means of a rned; and that there were two sorts of them, in one of which the reed was visible, as in our hautboy, but concealed in the other. (Berlin Mem. 1774, vol. v.) It is plain some fime had holes, which at first were but few; but afterwards were increased to a greater number; and some had none. Some were finge pipes, and some a combination.
FLUTE.

of several, particularly Pan’s syrinx, which consisted of seven reeds, joined together sideways.

These seven reeds had no holes, each giving but one note, in all seven distinct notes; but at what intervals is not known; perhaps they were the notes of the natural, or diatonic scale.

The Gorgon flute is different from the common one; it is inserted into the mouth, by the end, as the ordinary ones are; the end is flapped up with a plug or tampon, but the lower lip is applied to a hole a little way distant from it.

It is made equally big every where, and perforated with six holes, licks that of the mouth, and that opened by the key.

The flute was of such importance in antiquity, that among the Divi minorum gentium, some of the female divinities laid claim to a share in musical discoveries. Of this number was Minerva, or Pallas, the daughter of Jupiter, who is sometimes called Muses, or the musician; a name she acquired from a statue made by Demetrius, in which, when the serpent of the Gorgon were struck, they reformed like a flute. She is also honoured with the invention of chariots, together with having first used trumpets, and invented the flute. The vouchers for her musical talents are Paninius, Plutarch, and Pulfentius, among the prose writers; and Pindar, Nonnus, Ovid, Hyginus, Propertius, and Claudian, among the poets. The flute that she invented is said by Ovid to have been made of box, and by Hyginus of bone. Toramina rara, with few holes, it is natural to suppose.

Indeed the Syrinx, see plate IV. N° 6, said to have been invented by Pan, was found inconvenient. It consisted of a number of pipes of different lengths, tied together, or fastened by wax, which were played on, according to Lucertius, by blowing in them one after the other, moving the instrument sideways, for the admission of wind into the several tubes; and it was by the facility and penetration of Minerva, that it was found practicable to produce the same variety of tones with a single pipe, by means of ventages or holes, which had the effect of lengthening or shortening the tube, by a quick alteration of the column of air which was forced through it.

Two other circumstances are related of Minerva with respect to the flute; she is said by Hyginus to have found herself laughed at by her mother and sister, Juno and Venus, whenever she played the flute in their presence; this suggested to her the thought of examining herself in a fountain, which serving as a mirror, convinced her that she had been justly derided for the deficiency of her countenance, occasioned by swelling her cheeks in the act of blowing the flute. This is one reason given for her throwing aside that instrument, and adopting the lyre. However, a better cause, and one more worthy of her wisdom, is assigned for her throwing aside the flute, upon seeing Apollo perform on the lyre; for by having his mouth at liberty, she found that it enabled him to sing at the same time as he played, which afforded an opportunity of joining instruction to pleasure.

The invention of the flute having been given by the poets to Apollo, Mercury, Minerva, and Pan, is a proof of its high antiquity as well as importance. There are several flutes represented in sculpture of all forms: curved, straight, small, middle-sized, fipple, double, right, left, equal, unequal, &c.; these instruments were made of all kinds of wood and metal. They had different names alligned them, according to the country where they were made, or were chiefly in use: as the curved flute was called Pyrgian.

Vot. XIV.

or Tyrian, its name in Magna Grecia, or the Phoenician of the Egyptians, which was termed Monaulus. The flute had, indeed, so many different names in the Classics, and is applied to so many different purposes, that M. le Ferre, who had undertaken their explanation, ended his father's labours by a copy of Latini verba in præcis of Minerva, for throwing the flute into the sea, and anathematizing that he should take it out. But far from intriguing M. le Ferre, and without having the fear of Minerva before our eyes, we shall try if we cannot give some satisfaction by explanation of the terms equal and unequal flutes, right and left flutes, Sarracen flutes, Phrygian, Lydian, or Tibiafloris, Tibia impares, Tibia farrane, Phrygian, Lydian, &c., of which mention is often made in comedies preferred at Rome; we shall give what has been said, which was most probable and ingenious on this curious subject of antiquity.

In the comedies of Terence the flute-player is played on double flutes, or two flutes at the same time, that which they held in the right hand was called the right flute, and that with the left, for the same reason, the left. The right hand had few holes, and produced the higher, or lowest sounds; the left had many holes, and produced the grave or high notes. When the musician played two flutes of different sounds, it was said that the piece was accompanied tibia imparibus, with unequal flutes; or tibia dextris et sinistris, with right and left flutes; and when they played on two flutes of equal sound (or in unison), either right or left, as often happened, it was called the piece was played tibia paribus ductibus, with equal flutes, producing two sounds; or tibia paribus ductibus, equal left-handed flutes, producing a single note.

Donat pretends, that when the subject of a piece was grave and serious, the right-hand or base flutes only were used, which were called Lydian; that when the drama was gay and playful, the left-hand or high flutes were used, which were called Tyrian or Sarracen, which having high sounds were more proper for joy; and finally, when the subject was mixed, or as we should say, tragic-comedy, unequal flutes were employed, that is to say, right and left, which were called Phrygian.

At the Panathenaeum games, instituted at Athens in honour of Minerva, the patrons of that city, premiums were given to players on the flute, an instrument then in the highest estimation throughout all Greece, but in particular request at Athens; perhaps from the legendary account of its invention by Minerva, the protectress of that city.

Aristotle tells us, (de Land. S.p.) that the flute, after its first invention, was used by mean people, and thought an ignoble instrument, unworthy of a free man; till after the invention and defeat of the Persians, when ease, effusion, and luxury, found its use to become common, that it was disgrace to a person of birth not to know how to play upon it. Callias and Critias, celebrated Athenians, Archias of Tarentum, Phileolaus and Epaminondas, were able performers on the flute.

The Thebans in general piqued themselves much on being great performers on the flute. This is manifest from a passage in Dion Chrysostom. "The pre-eminent," says he, "which all Greece unanimously allows to the Thebans, in this particular, has been constantly regarded by them as a point of great importance, of which I shall give an instance. After the total ruin of their city, which has never yet been rebuilt, no part of it being now inhabited but the small quarters, called Edynus, they gave
FLUTE.

themselves but little trouble in restoring any of the public monuments that had been thrown down or destroyed, one statue only of Mercury excelled, which they took great pains to dig out from among the rubbish, and to erect again, on account of the following inscription: Ἐκλεκ μὴ ἔνεκ τόποις περιγραπτόμεθα. — "Greece has declared that Thebes wins the prize upon the flute." So that this statue is still standing in the old public square, among the ruins."

Pronomus, a Thespian, according to Pausianias, invented a flute, upon which he could play in three different modes. Before his time, there was a particular flute for every mode or key: and so out of tune are the generality of modern flutes, it were almost to be wished that the custom had still continued. The words and music of a hymn, composed by Pronomus for the inhabitants of Chalcis, when they went to Delos, were sung in the time of Pausianias, as was likewise the statue of this musician, erected by the citizens of Thebes, near that of Epaminondas.

Pericles, who had invited Antigenides to Athens, and who had undertaken the superintendence of the education of Alcibiades, his nephew, appointed Antigenides for his flute-master. But Aulus Gallus relates, from the History of Mitha, in thirty books by Pampilla, that his scholar Alcibiades feigned up for a fine gentleman, and taking the utmost care of his person, was soon disfigured with his instrument, as Minerva herself had been before; for happening to see himself in a mirror, while he was playing, he was so shocked at the distortion of his sweet countenance, that he broke his flute in a transport of passion, and threw it away, which brought this instrument into great disfavour among the young people of rank at Athens. However, this disfigurement did not extend to the sound of the flute itself, since we find by Plutarch, that the great performers upon it continued long after to be much followed and admired.

Horace speaks of bands of female flute players, which he calls "Ambobabaurum Collegia," and of whom there were still colleges in his time. But the followers of this profession became so numerous and licentious, that we find their occupation prohibited in the Theodosian code; however, with little success; for Procopius tells us that in the time of Justinian, the officer of the empress Theodora, who was a Tiberian, appeared on the stage without any other drefs than a flight scarf thrown loosely over her. And those performers were become so common in all private entertainments, as well as at public feasts, obtunding their company, and placing themselves at the table, frequently unasked, that, at the latter end of this reign, their profession was regarded as infamous, and utterly abolished.

Dorion is mentioned by Plutarch as a flute player who had made several changes in the music of his time, and who was head of a sect of performers, opponents to another sect of practical musicians, of which Antigenides was the chief; a proof that these two masters were cotemporaries and rivals. Dorion, though much celebrated as a great musician and poet, by Athenæus, is better known to posterity as a voluptuary. Both his music and poetry are lofty; however, many of his paeans are preferred. Being at Milo, a city of Egypt, and not able to procure a lodging, he enquired of a priest who was sacrificing in a chapel, to what divinity it was dedicated, who answered, to Jupiter and to Neptune. How should I be able, says Dorion, to get a lodging in a place where the gods are forced to lie double? Supping one night with Nicoereon, in the island of Cyprus, and admiring a rich gold cup that was placed on the fide-board, the goldsmith will make you jest such another, says the prince, whenever you please; he'll obey your orders much better than mine, sir, says Dorion; so let me have that, and do you bespeak another. The remark of Athenæus upon this reply is, that Dorion acted against the proverb, which says, that "To flute-players, nature gave brains there is no doubt, but alas! 'tis in vain, for they soon blow them out."

Upon hearing the description of a temple, in the Nauplius of Timothetus, Dorion said, he had seen a better in a boiling cauldron.

Having left a large shoe at a banquet, which he wore on account of his foot being violently swelling by the gout, "the only harm I with the thief, said he, is, that my shoe may fit him."

His wit and talents made amends for his gluttony, and he was a welcome guest wherever he went. Philip of Macedon, in order to enliven his parties of pleasure, used frequently to invite him with Aristophanes the citizen.

The importance of the flute is manifested in innumerable passages in ancient authors; among which there is one in Pliny that is diverting and curious. In speaking of comets, Pliny says that there were some in the shape of flutes, which were imagined to forebode some ill to music and musicians. (Tibianum specie, musicæ arti portendere), and Montfacon proves by several inscriptions from ancient marbles, that the fictacular Tibicen at Athens was always chosen, and his name recorded with the officers of flute, (Supple. tom ii. cap. 25.)

After speaking of so many flute players of the male sex, it is but just to say that they did not monopolize the whole glory arising from the cultivation of that instrument; as the performing upon it was ranked, in high antiquity, among female accomplishments. Its invention was ascribed by the poets to a goddess; it was the symbol of one of the Muses; and it was never omitted in the representation of the Sirens. However, the same reason which provoked Minerva to throw it aside, has luckily inclined modern ladies to cultivate instruments, in performing upon which, their natural charms, instead of being diminished, are but rendered still more irrefrangible.

The most celebrated female flute-player in antiquity was Lamia; her beauty, wit, and abilities in her profession, made her regarded as a prodigy. The honours she received, which are recorded by several authors, particularly by Plutarch and Athenæus, are sufficient testimonies of her great power over the passions of her hearers. Her claim to admiration from her personal allurements does not entirely depend, at present, upon the fidelity of historians; since an exquisite engraving of her head, upon an amulet, with the veil and bandage of her profession, is preferred in the king of France's collection, which, in some measure, authenticates the accounts of her beauty.

As she was a great traveller, her reputation soon became very extensive. Her first journey from Athens, the place of her birth, was into Egypt, whither she was drawn by the fame of the flute-players of that country. Her person and performance were not long unnoticed at the court of Alexandria; however, in the conflict between Ptolemy Soter, and Demetrius, for the island of Cyprus, about 312 years B.C. Ptolemy being defeated in a sea engagement, his wives, domestics, and military stores fell into the hands of Demetrius.

Plutarch, in his life of this prince, tells us, that "the celebrated Lamia was among the female captives taken in this victory. She had been universally admired, at first, on
on account of her talents, for she was a wonderful performer on the flute; but afterwards her fortune became more splendid by the charms of her person, which procured her many admirers of great rank." The prince, whose captive she became, and who, though a successful warrior, was said to have vanquished as many hearts as cities, conceived to violate a passion for Lamia, that, from a sovereign and a conqueror, he was infantly transformed into a flave; though her beauty was now on the decline, and Demetrius, the handomest prince of his time, was much younger than herself.

At her invitation, he conferred such extraordinary benefits upon the Athenians, that they rendered him divine honours; and as an acknowledgment of the influence which she had exercised in their favour, they dedicated a temple to her, under the name of "Venus Lamia."

The flutes of the ancients alone have furnished Bartholinus with materials for a very learned and instructive work (De Tibia Veterum), in which he has collected all the classic descriptions of the different instruments included in the class of flutes, and pointed out all the allusions to them in Greek and Roman authors, furnishing subsequent modern writers with a body of information on the subject, which has enabled them to appear very learned with very little trouble. So many different kinds of ancient wind instruments under the denomination of flutes are represented in sculpture, some plain without holes, some with two, some with three, and some with five holes, others with plugs, Ropans, or, as Merianus calls them, tuberculi (nipples) at the sides, some double, and some so large, that they must have been an octave below the others. Horace speaks of flutes with few holes, as well as lyres with few strings:

"Tibia non ut nunc orichales vineta tuberque
"Æmula, fed tensis, simplexque foraminis paene."

Ovid has the same remark:

"Prima terebro per rara foraminis luxuro,
"Ut daret effect, tibia longa fons."

Sidonius gives the flute seven holes; but Avienus gives it a thousand.

"Foraminibus tibia mille sunt."

The learned are very discordant in their opinions and explanations of the flutes used in the comedies of Terence; nor does any one discover the least knowledge of modern practical music, sufficient to lead them to intelligible discoveries on the subject. Bianchini "De tribus generibus instrumentorum musicarum veterum organis," and Bonani, in his "Gabinetto Armonico," have copied the antique representations of ancient musical instruments, but we have long seen that there is no dependence to be placed on their fidelity. Sometimes ignorance, and sometimes picturesque convenience, have occasioned blunders and deviations from truth in the original sculptors. In the supplement to the folio edit. of the Fr. Encyclopédie, it is suppos’d that all the ancient flutes had reeds; but of two kinds: one visible and the other invisible, like those in children’s trumpets; the oblique flute, or flauto traversiere, commonly called the German flute, was unknown to the ancients. According to the author of this article, the ancients had no real flute à bec, or traversiere; but all were played with reeds, like the modern hurtnois. The plugs, or flappes at the sides of ancient flutes, which served instead of keys, are imagined to have been used occasionally to stop certain holes which, in changing the mode, would not be wanted.

In this long article concerning flutes, or rather the hautbois, not a word is said of double flutes. Our belief how ever is, that the tibicines were two tubi in unison with each other; and that the tibicines were tuned all ottava. We can conceive no other harmonical use that could be made of them, as it is now generally believed that the ancients had never cultivated counterpoint, or figurative harmony. But something must still be said in this article, as long as it is already, concerning modern flutes.

The common flute, or flute à bec, from the upper end, or mouth-piece, resembling the beak of a bird, at the beginning of the last century, till the works of Corelli came out, was far more general use as a concert instrument than the violin. Sonatas for two flutes, and a thorough bass, violoncello or theorbo, were innumerable; with solos, duets, and concertos for the same instrument; nor was there a ballad then printed which was not thrown for the flute at the bottom of the page; as in the middle of the same century, almost every long and tune was set for the guitar. The concert flutes for which this music was composed were generally F and C. There is an imitative flout in the organ, called the flute, composed of open wooden pipes in unison with the principal; but much more soft and tender. This flout is always in the choir organ. The flute is shown by Mr. Maxwell, in his "Effays on Tune," p. 17, to belong to the class of imperfect instruments, vide Perfect Instruments.

Flute traversiere, Fl. Flauto traversiere, It. horizontal.

Flute Allemande, or German flute, a wind instrument of wood or ivory, consisting of four pieces, or joints, inserted one in the other. In the Fr. Encyclopédie a minute a description is given of the several parts of this instrument, its joints, holes, or perforations, keys, tenons, and bung at the top of the mouth-piece, that in ingenious turner who never saw a German flute would find little difficulty in making one; but we shall lay no more on the mechanism of the instrument, but confine our instructions to its use.

To become a good performer on this instrument, the student must begin by acquiring a good embouchure, or by procuring a clear, full, and sweet tone; a talk far more difficult than is generally imagined. Every one can produce a tone on a common flute, but few are able, without teaching, to make the German flute speak. The instrument being blown at the side, whereas it has its name of traversiere, must be held parallel to the shape of the mouth, that the stream of air issuing from the breath of the performer may enter in part at theingle orifice in the upper piece. Whoever can whistle in the pipe of a key, will soon produce a tone in the German flute, which will be harsh at first, but must be smoothed and refined by degrees, never forgetting in every day’s practice to make that a principal consideration. Whether sitting or standing, the performer must be erect in his carriage, the head rather above than below its usual position, and a little inclining to the left shoulder; the hands high, without raising the elbows or the shoulders; the left hand bent out, and the name arm near the body. If the player is standing, the attitude should be firm, the left foot advanced, the body resting on the right hip, and the whole performer free from constraint. The greatest care should be taken not to move the head or body, as many do, in order to mark the time. The attitude should have no irregularities, nothing awkward or affected to attract the attention, or prejudice the audience against the performer. With regard to the position of the hands, the left is to be at the top of the flute, which is held between the thumb of that hand and the fore finger, which ought to stop the upper hole, marked 1 in the figure, the second hole with the middle finger, and the third by the ring-finger. The right hand is to hold the lower part of the instrument; the thumb of this hand, which must be a little bent.
best inwards, supports the flute below, and the three fingers of this hand, the fore finger, the middle finger, and ring finger, flop the holes marked 4, 5, 6; the little finger serves to press down the key at the tail piece, or lowed joint, which key opens a hole out of the reach of the fingers. The flute must be held horizontally. No instructions for the lips in blowing the flute can suit the form of all mouths; but when the student can make the instrument speak easily and freely, he must turn it in and out, by small degrees, till he gets the best tone possible; and then, beginning with the chief well filled with wind, as left as possible to swell by minute degrees any note to its utmost power, and then to diminish it by the same degrees to a thread. We shall give among the plates a complete scale of every sound that can be produced on the instrument. Having worked upon one and the same note till a full and clear tone can be produced on a short notice, begin on the lowest found D, to swell and diminish each note in the same manner as the first, and let alone rapid passages and execution, till certain of the tone of the instrument: as fingers are obliged to follow, going no further than a hexachord for a long time; swelling each note to the utmost power of the breath and lungs, ascending and descending, to acquire steadiness in sustaining a note perfectly in tune, and free from all tremulous uncertainty during the most crude and violent accompaniment. See Musical Plate.

The tablature contains seven ranges of black and white indications of the seven holes that are to be occasionally stopped and opened on the flute. The black represent the fingers, and the white or open circles the holes unstopped. The compass of the German flute at present extends to three octaves, from the lowest D in the treble, to the octave above what used to be the highest D. [A C % or D below the D natural, has lately been acquired, by blowing very softly and turning the instrument inward.] It is to be observed that the higher the notes on this instrument are, the wind must be encreased, and the orifice of the lips somewhat more closed. Most of the notes are broken into octaves by a little additional force in blowing. The B, C, D, of the third octave cannot be produced upon all flutes; with middle pieces which lower the tone of the whole instrument, they are easier to be produced; the lower the better. There are sometimes seven middle pieces in use for flattening the pitch. These amount to about a tone; so that by their aid the same instrument may accommodate itself to any pitch. Not only all the semitones are given in the general scale on the first plate, but the flats on a second plate, which are indicated by the black and white ciphers. The finger over the white open cipher is to be closed, and the semitone is to be produced. There are nine flats in the language, accents, flats, &c. must be practiced separately.

Flute, or Organ, is a range of pipes, constructed to imitate the notes of the common flute or flageolet: it is softer than the principal in its tone: its pitch is an octave above the notes of the diapasons, or in unison with the principal flageolet.

Flute, or Fluy, is also a kind of long vellum, with flat ribs, or floor timbers, round behind, and swelled in the middle: serving chiefly for the carrying of provisions in fleets, or squadrons of ships: though it is often used in merchandise.

The word flute, taken for a fort of boat, or vellum, is derived, according to Borel, from the ancient flute, a little boat. In the verbal proverbs of the miracles of St. Catherine of Sweden, in the 12th century, it is used in "Unus equum form una cum transuse in magia ponders introductit super instrumentum de lignis fabricatum, vulgariter dictum fluta." Upon which the Hollandists observe, that in some copies it is read flotta, an instrument called by the Latins rotellis; and that the word flotta, or flotta, arose from flotto or flutten, to float.

Flute, in weaving tapestry. See Tapestry.

Flutes, or Flutings, are longitudinal concavities depress'd in the surface of a piece of architecture, generally of a circular or elliptical section, meeting each other in lines, or separated with a part of the surface from which the excavation is made left standing between. The surface separating every two flutes is called a fillet; if the flutes are parallel or diminuith according to any law, the fillets are also made parallel or to diminish in the same law.

And if the flutes run in a straight line, or in a curve at right angles to the section, the fillets follow the same direction. When fillets separate the flutes from each other, each fillet is in breadth from one-third to one-fifth of the breadth of the flute. That species of fluting where the flutes meet each other without the intervention of fillets, is generally applied to the shaft of the Doric order, and the other with fillets to the shafts of Ionian and Corinthian. Flutes frequently terminate semicircularly on the face or with spheric heads, and sometimes their terminations are planets at right angles to their longitudinal direction. The Greeks never applied fluting to any member of the Doric order, except to the shaft, which was almost a universal practice, there only being two known examples to the contrary, nor even to the Ionic. The Romans frequently overcharged all the plain and cylindrical members. For a more particular description of fluting, see Doric and Ionic Orders.

Flutes, or Flutings, are also used, in Botany, to denote the stems and fruits of certain plants, which have furrows analogous to those of flute columns.

Flutter, or Majic, is a term applied by Dr. Robert Smith (Harmonics, p. 97.) to the fluctuating roughnesses in the found of two notes which are discords to each other: a phenomenon very distinct from the beats of imperfect consonances; the latter being, because the succession of their short cycles are periodically confused and interrupted, whereas discords have this characteristic fluctuating, when their ratios are quite perfect, and when concords, under the same circumstances, cease to have any beats, but produce a perfect consonance, or uniformity of sound. See Concord.

Fluvanna, in Geography, a county of Virginia, bounded N. by Albemarle, N. E. by Louisa, E. by Goochland, W. by Amherst, and S. by Fluanna or James river, which divides it from Buckingham. It is about 22 miles long and 20 broad, and contains 2,703 free inhabitants, and 3,936 others. There is great pled of ore, and some inferior white and variegated with blue, red, and purple veins found in this county, on James river at the mouth of Rockfish; where it forms a large precipice overhanging a navigable part of the river.


Fluviana, in Geography, a river of Spain, in Catalonia, which runs into the Mediterranean, in the gulf of Roses. N. lat. 42° 10'. E. long. 2° 56'.

Fluvialites Cochlearis, fresh-water shell-fish, a term used by naturalists to express those kinds of shell-fish which never inhabit the sea, but are found in our ponds, rivers, and ditches. These, though much less numerous than the species of sea shells, are yet of a greater variety and beauty than is usually supposed. See Conchology.

Flux, in Enamel, is that glossy body that forms the basis of all enamels, whether transparent, semi-transparent, or opaque. Now as the painting on enamel is performed with vitreous colours, which to speak truly can be nothing more
FLUX.

or left than coloured enamels, it must be evident that flux likewise forms a principal part in the composition of enamel colours.

FLUX. Enameller's, is a sort of enamel principally used for the upper surfaces of plates intended for enamel painting. It differs from the common enamels, in being of a more mellow and rich quality, whilst its properties facilitate the fusion of those colours which are employed in painting on it. The best kinds having been generally brought from Venice, have acquired the name of Venetian flux, and are commonly imported in the form of small beads, hence called lead-flux, or short pipes about three-eighths of an inch in diameter, and from three quarters of an inch to an inch in length: the latter is called pipe-flux. The fluxed plates, when prepared as described under Enamelling, have a rich yellow hue, or cream colour; by which they are rendered of particular utility in paintings where much of the naked figure is exposed. The flux must always be laid upon hard enamel; as the properties of glass enamel are inimical to effective cohesion, the flux cracking in circles, or flying off in pieces as the plates cool.

In order to give a clear idea of the nature of fluxes, it will not be improper previously to inquire more particularly into the nature of the ingredients, their operations on each other in a state of composition, as well as the power which each exerts in producing a proper effect; since by this means such an initiative knowledge may be obtained, as will enable persons unacquainted with the art to conduct their experiments with more certainty, than they possibly could by any particular recipes, however good they might be.

There are two kinds of substances which enter into the composition of enamel fluxes; the one, the proper matter of the flux, being principally such bodies as are by their nature endowed with a strong propensity to run into the vitreous fusion, and be converted into glafs, at the same time that they affimilate and change other bodies in combination with them into their own vitreous nature. This kind consists principally of fusible substances, lead, and arsenic. The other kind consists of the correctives of these proper fluxings, which without their admixture would be found to have qualities that would deprive them for enamelling or the fluxes for paintings. For all kinds of fluxes, when vitrifled by themselves, or with a small proportion of other bodies, are still liable to be dissolved by aqueous moisture; and flux, made of such ingredients only, would be corroded even by the common air, and turn black and dull on its surface; hence it becomes necessary to add some other bodies as correctives to prevent these bad tendencies, and render the flux more durable. Lead and arsenic, when formed into glafs, of which they compose the principal ingredients, are particularly liable to be thus corroded; to prevent which, when using these fluxes, it is necessary to add considerable proportions of the corrective matter. The truth of these remarks may be readily ascertained by the appearance of the enamel door-plates about this town, in many of which the lead, having been used in too great a proportion as a flux for the black colour, has been so far corroded as to have admitted the air to come in contact with the colouring matter, in which case the whole writing is almost obliterated.

The most common of these corrective bodies of the proper matter of the flux, and which therefore make the second kind of substances of which enamel fluxes are composed, are calcined clints, and Lynn sand, or what is generally known by the name of silver sand, which being perfectly white, and refilling when vitrifled the corrective and decomposing action of all menitrus, give body and hardness to the fluxes, without any other disadvantage than that of diminishing, in a certain degree, their inclination to vitrify, and on that account rendering them somewhat weaker as fluxes than they would be if used alone.

The most active kind of salt as a general flux is borax, which possesses the greatest power of any simple body hitherto known. Lead, which is the next, vitrifies with a very slight heat, and at the same time analogous to other bodies to its own nature, such as earths, stones, the oxides of metals, &c. Arsenic is likewise a powerful fluxing substance; but whenever this is used it should be, with bodies that have been previously vitrifled and ground tolerably fine, otherwise it is apt to sublimate and fly off from the composition with which it is mixed, and which of course must render any recipe, where a certain proportion of this is to be used, very liable to error without such precautions. Several kinds of salts possess the next degree of fluxing power, the principal of which is sea salt; but it must be evident from what has been mentioned, that they are not sufficiently strong to form an enamel flux by themselves, yet as they are perfectly colourless when vitrified, which is not the case with lead, they will be found very useful in composition with lead, or when used in place of that substance, allied by borax, especially where any tinge of yellow would be detrimental to the colouring matter that is to be used with the flux.

Having endeavoured to give the reader an idea of the nature of the fluxes that are used in the formation of enamels, we shall next endeavour to explain the method of compounding them before they are fused, and also some observations upon that part of the process.

When the materials are procured, taking care that they are of the best quality, each should be separately levigated either in an agate mortar, or one made of the same kind of glass as the common wine bottles are made of; the pestle in either case should be of flint or agate. The proportions of each substance, having first been thoroughly mixed, the whole must be put into crucibles of a proper size, and placed in an air furnace, or what is more commonly called a wind hole, where the heat should be increased till the matter is perfectly vitrified, which may be known by its becoming clear and transparent. The heat must be sufficiently powerful, yet not too violent, for though a great heat may accelerate the vitrification, yet it at all times hardens the composition, and greatly reduces the fluxing power. The simplest method of dipping the end of a tobacco pipe in the flux while in a state of fusion, and examining the small quantity that adheres to it, will enable a person to form an accurate judgment of the whole; for if it appears clear and transparent it may be concluded that the vitrification is complete, but if any cloud of parts appear including opaque specks, it is evident that a longer continuation of heat is necessary. When the quantity is small it becomes very difficult to get the whole out of the pot; the best method perhaps is to hold the edge of the pot with a convenient pair of tongs, and at the same time scrape the matter out with a small piece of iron, the edge of which should be previously made to at the bottom of the crucible. Whoever would have flux in the greatest degree of purity, must previously prepare the clints of lead to be ready at all times for use, for although lead might be mixed with the other ingredients for common purposes, yet it will be better in all cases to prepare it previously by the following means.

Take of the bell-minium, or, as it is commonly called, red lead, four pounds; of Lynn sand, or calcined clints, two pounds and a quarter; these two substances should be thoroughly
thoroughly mixed, and be put into a very found crucible. One that has had flux or a little flint glafs melted in it before would be preferable, for when a new pot is used, the lead is very liable to strain through the pores, and thus occasion an uncertain refult, although the quantities should have been ever fo nicely adjusted. This is to be vitrified in the fame manner as directed for flux, and when perfect will be of a beautiful topaz or transparent gold colour. When the matter is cold, it should be ground in the mortar before defribed, and then kept perfectly free from durt.

In molt large concerns in the glafs busines is fond greatly preferable to flints, as the trouble of calcining and grinding the latter, where large quantities are wanted, is a ferior objection to their ufe. But in the cafe of flux, where quality is of more confequence than quantity, flints are certainly preferable.

The method of preparing the flints for ufe, is to place them in a clear fire, in which they fhould continue two or three hours; the fire fhould then be increafed till they attain a white heat, at which time they fhould be taken very quicfly from the fire and plunged into cold water, which will caufe them to crack and faw in innumerable parts; they muft then be broken into pieces, and if they are of an uniform whitenefs throughout, they may be considered as fit for grinding; but if any black and discolourd places appear, they muft be again submitted to the fire, and the immersion in water repeated; the calcination being then completed, they muft be broken as small as poaffe with a steel-faced hammer, and ground very fine in the glafs or agate mortar.

A very important advantage attending this preparation of the glafs of lead, is the ease with which a very perfect vitrification of the fand or flints is effected without the aid of intense heat; at the fame time the mixture is rendered more capable of affimilating with a larger proportion of flints, which will in all cafes add greatly to the foftnefs of the flux.

Very little hope is entertained that any more of the Venetian hard enamel or flux for grounds will be imported into this country, as we are affured that Bertolini, the celebrated maker of thofe fubfiances, perifhed in the hands of the French at Naples, on account of his political opinions. We feel much pleafure in being able to fay, however, that Mr. Griffiths of Broad Court, Long Acre, London, after many years spent in making enamel colours, has fucceeded in making flux for grounds equal to any of the Venetian, which he has confantly for fale. He has likewise, within the laft three years, brought to perfedion a beautiful white, hard enamel, which is fo neary equal to the Venetian, that the one might be mistaken for the other, the colour and fracture being fo much alike.

The firft recipe for the formation of a flux, and which we shall call N. 1, is the white glafs enamel, which, containing a large proportion of arfenic in a femi-vitrified state, requires to be broken into small pieces, and fufed till the matter becomes quite clear and transparent; the arfenic will by this means be completely vitrified, and convert the glafs into a foft and ufeful flux, fit to be mixed with molt of the earths that may be ufed as colours. And likewise, with the oxys of all the metals, gold and filver excepted; for it must be remembered, that lead and arfenic are both apt to injure the beauty of the colours that are produced by gold and filver: therefore, whenever they are ufed, it must be with a flux that is compofed without either of these ingredients; or if they do enter the compofition, it muft be in very fmall proportions.

Composition of a fopter flux for common purpofes, where the glafs may be found too hard, N. 2.—Take of the glafs of lead one pound; of pearl afhes, five ounces; of borax, five ounces; and of arfenic, half an ounce. This flux is fuitcd, by its foftnefs, to be mixed with colours that are to be ufed in glazing over others, where a harder flux has been ufed, and in moft cafes, where burning the colours with a flight heat is advantageous.

Composition of a flux perfectly pellicid and very foft, N. 3.—Take of common fint glafs, powdered very fine, seven ounces; of borax, one ounce and a half; of pearl afhes, two ounces; and of fciafi, one ounce. This flux, by its foftnefs and cleareftry, will be found very ufeful for the oxys of gold and filver; likewife in all cafes where a tinge in the flux might be detrimental to the colouring fubfance that is to be ufed.

These fluxes, in the proportion here given, have been found to answer the purpofes for which they are intended extremely well; but as the ingredients fometimes vary in their quality, it is evident that much muft at all times be left for the ingenuity of the operator to supply. Indeed, when the difficulties that every perfon muft meet with in attempts of this nature, without a previous knowledge of chemistry, are confidered, we cannot do better than ad- vife a ftudy of that fcienee as an introduction to the art of enamelving and enamel painting, by which means a complete theory of the various fubfiances may be obtained, which, in the course of practice, may lead to ufeful dif- coveries; or, to lay the leaft, will many times prevent ufe- less experiments being made.

We muft not omit noticing in this place, that plate-plate enamellers found great inconvenience in the fads of the Venetian white hard enamel, as that fubfance was principally ufed for the bottoms or backs of plate-plates manufactured of the English glafs enamel; for the expansion of these two fubfances is fo exadly fuitcd each other, that it was very rare that any of them cracked in the fire. This, however, was not the cafe with all the kinds that were brought from Venice, and particularly a blue fort, famped on the cafes with the figure of a monkey, and commonly called monkey-enamel. This fort was very apt to crack the plates in circles, after they had been made a few weeks, unlefs it was ufed in compofition with other fubfances, whose fluxes, being fottcr, contributed to counteract this disagreeable property.

These obervations tend to confirm what we have before flated respecting the neceffity of laying flux for grounds on hard enamel, becaufe the English glafs enamel, being much harder from the nature of its compofition, does not run into fusion with the fame heat as the flux; consequently a perfect addition cannot take place between these two fub- fances. For a further account of the proportions of flux ufed in enamel colours, see Painting on Enamel. Hand- maid to the Arts, vol. i. and ii.

Flux, in Hydrography, a regular, periodical motion of the sea, happening twice in twenty-four hours; wherein the water is rafed, and driven violently against the fhores. The flux, or flow, is one of the motions of the tide, (see Tide); the other, whereby the water raps and retires, is called the reflux, or ebb.

There is also a kind of refl, or ceafation of about half an hour, between the flux and reflux; during which time the water is at its greatest height, called high-water.

The flux is made by the motion of the water of the sea, from the equator towards the poles; which, in its progrefs, striking against the coasts in its way, and meeting with opposition from them, rakes, and where it can find passage, as in flats, rivers, &c. rifes up, and runs into the land.

This motion follows, in fome measure, the course of the
the moon; as it rises or comes later every day by about three quarters of an hour; or, more precisely, by forty-eight minutes: and by so much is the motion of the moon slower than that of the sun. It is always highest and greatest in full moons, particularly those of the equinoxes. In some parts, as at Mount St. Michael, it rises eighty or ninety feet, though the general height above a foot or two, and in some places, as about the Morea, there is no flux at all. It runs up some rivers above a hundred and twenty miles. Up the river Thames it only goes eighty, viz. near to Kingston in Surrey.

Above London-bridge, the water flows four hours, and ebbs eight; and below the bridge, flows five hours, and ebbs seven. See Tides.

**FLUX.**

In Medicine, often called also bloody flux, the popular appellation of Disenteroty, which see.

**FLUX.** in Metallurgy. All those substances which have been employed to facilitate the separation of metals from their ores, or to give greater fluidity in the fusing or melting of metals, have by manufacturers been denominated fluxes.

Fluxes employed in separating metals from their ores have the effect of rendering the substances with which the metal is combined, capable of fusion. The whole is, by this addition of the flux, rendered fluid; the metal, being the heaviest fluid, sinks to the bottom; while the fluid mafes, arising from the earthy matters of the ore, combined with the flux, floats on the surface: the latter, on cooling, puts on a vitreous appearance, and is, by manufacturers, called *forin.* Hence it will appear, that the flux employed must be such a substance as may be best calculated to render those substances more fusible with which the metal is combined.

If the ore abounds with *filex,* potash or soda is best calculated to separate it from the metal. Tartar, which contains the tartaric acid united with the potash, and frequently abounds with much vegetable matter, is employed to great advantage in the small way. The hydrogen and carbon present, take the oxygen from the metal; while the potash combines with the *filex,* forming a fluid vitreous mass, more or less coloured by the oxides of the metal.

The fluxes known by the names of black flux and white flux are generally used in the smaller experiments. The former is made by detonating one part of nitre with three of tartar, so that it contains at least an excess of carbonaceous matter, which is fitted for the reduction of the metallic oxide, while the potash, derived from the nitre and tartar, combines with the earthly products.

That called white flux, is formed by detonating equal parts of nitre and tartar, by projecting the mixture, by a small quantity at a time, into a red-hot crucible. In these proportions the whole of the carbonaceous matter of the tartar is destroyed by the oxygen of the nitre, and nothing more is obtained than a sub-carbonate of potash. It will appear evident to every chemist, that common tartar, or for nice experiments, that super-tartar of potash, will answer all the purposes of the black flux, and the sub-carbonate of potash is equally well taken for the latter. Some have recommended the nitre and tartar to be used together; but this will always be improper where the oxidizing action of the sub-ultramundine is intended. Nitre possesses a power so much the contrary, that it is capable of oxidizing gold.

In the large way, on account of cheapness, lime is employed to separate the *filex.* Barytes, if it could be found more plentifully, might be used to more advantage for separating *filex,* particularly from iron ore.

Lime is found to be the best flux for smelting the alumino-ous iron ores, from the great fusibility of due proportions of those two earths. Should the ore abound with *filex,* its reduction is found more difficult. It might be an advantage, where ores of this kind occur, to use some cheap compound of barytes, such as the sulphate of that earth.

From what has been observed, it will appear that it is of the greatest importance to be acquainted with the nature of the earthly matter in the different ores. Whether the ore contain alumina, lime, or both these substances, a certain quantity of one of them should be added, as will make the most fusible compound of the two. If the alumina be in excess, lime must be added, but if the ore be calcareous, which is sometimes the case, it is found necessary to add flux. In the smelting of iron ores, however, the fusibility of the earths is much increased by the oxides of iron, which always, more or less, colours the scoria. The oxides of iron is found to exert a much stronger affinity upon *filex* than upon any of the other earths, and hence those iron ores abounding with *filex,* when smelted, afford more coloured scoria, and in consequence are less productive.

In the smelting of copper ores, which contain *filex,* it is common to add some substance which contains oxide of iron; pyrites is generally used to afford this substance. But many copper ores contain iron, and add the addition of this substance as a flux. The oxide of iron combines with the *filex,* forming a dark coloured fusible compound, which floats on the surface, leaving the copper free from both those substances.

Most of the fluxes used in fusing or smelting those metals liable to oxidate by the presence of the oxygen of the atmosphere are such, as by fusing, when the metal would begin to oxidate, envelope the metallic surface, and prevent the combination of the oxygen. Of these ashes are many saline bodies, such as borax, potash, soda, tartar, muriate of soda, &c. In short it should be such a substance as may fuse before the body becomes very hot. It should have no action upon the metal itself, and it should possess so much fixity as not to be volatilized by the heat required for the fusion of the metal. If the flux be at all liable to fly off, a fresh quantity should be frequently added.

Another species of fluxes act by reducing the oxides as fall as it may be formed. The fusible metals are generally treated with those inflammable bodies, which combine with oxygen, with great facility, and at the same time involve the metallic surface. Roof and fatty substances are mostly employed for lead, tin, antimony, and bismuth, or their alloys. Zinc requires to be treated in a close vessel with charcoal powder, or pounded pit-coal.

The vitreous and saline fluxes which act by preventing oxidation, are employed for cast iron, copper, brass, &c. Pounded glas, or a mixture of lime and clay, may be employed for cast iron; potash or tartar for copper and brass.

The scoria of blast furnaces is generally used in the fusing of steel which is to be cast into ingots. If too much of these fluxes be used, the firmness of the crucible will be endangered. Muriate of ammonia has a very peculiar property of freeing the surfaces of metals from oxygen. This has been explained, by supposing that the ammonia is decomposed; the hydrogen of which combines with the oxygen. This does not, however, clearly explain the fact, for the muriate of ammonia is not decomposed by this process, and much less by the ammonia. It is well known to those who manufacture this muriat, that if any metallic oxide be present when this salt is sublimed, the oxide fuses with it, forming a triple salt. Indeed the substance, known in medi-
cine by the name of *floria martialis*, is formed in this
way, and is a triple mixture of iron and ammonia.

The great utility of this fact in the folding of metals, therefore, consists in carrying off the oxygen from the surface, at the time it hardens.

Rough and flat substrates used in folding give great fluidity and brightness to the folder, and clear the surfaces to be united, by their carbon and hydrogen taking the oxygen which may be present.

The fluid employed in folding iron, brass, and copper, are generally borax, (ful-horat of fola.) After the folder and the surfaces are once made clean, this borax acts, by preventing oxidation, till the folder fuses, and unites the two surfaces.

That this is the true explanation of the action of a flux, in folding, we have abundant proof, in folding one noble metal with another. When fine gold is employed for folding platinum, the gold is observed at the time of fusion to assume a degree of fluidity far superior to any folder made of oxidable metals, although the latter be assisted with the bell-flux.

In the fusion of these metals liable to oxidate, whether the fusion may be for the purpose of folding or casting, certain fluxes are found to be indispensable. The fluidity is so much improved, that in the latter process, without a flux, the folder would not be able to run between the surfaces to be united, independent of its action in preventing the oxidation of the surfaces. In the casting of metals, the fluidity would sometimes be so imperfect, without the presence of the flux, that impressions taken from the mould would be exceedingly defective, and small articles, such as needles and fish hooks, could not be cast at all.

We shall conclude this article by giving a short explanation of the cause of increase of fluidity by the agency of fluxes.

Although an idea is entertained by chemists, that there is no medium between that pulpyulent plate called the oxidated and the metallic plates, it will be found that the oxidable metals combine with oxygen when exposed to the air in a plate of fusion, without losing their metallic form. They however lose much of their luire and fluidity. Of this fact we have a striking proof in silver, which in the act of refining has been long exposed to a current of oxygen for the purpose of freeing it from the hafer metals. At the time the silver affinates the fold form, the oxygen is given out in the form of gas. Mr. Lucas, a refiner of Sheffield, by throwing the liquid silver into water, collected an abundance of pure oxygen gas.

The partial loss of luire and fluidity from the combined oxygen, is soon very apparent in melted zinc, both of which may be completely restored, by treating it in a close vessel with charcoal powder. All the oxidable metals are more or less susceptible of this change, proportionate to their affinity for the said substance.

From what has been observed we may infer, that it is highly injudicious to expose much of the melted surface of metals to the air. Hence the iron ladles used for the fusible metals, as well as crucibles, ought to be as narrow as possible at the top, at the same time that fume fusilbute should be employed, which will either prevent the oxidation, or reduce the oxyd as it is formed.

FLUXES, in the Manufacture of Glass, are red-lead, pearl-ashes, nitre, tea-salt, borax, arsenic, the fever of forges, commonly called clinkers, and wood-ashes. See Glass.

FLUXION, was a term, in Surgery, much employed by the ancient writers and practitioners to signify the motion by which, according to theories now exploded, the humours were spontaneously determined, with a certain velocity, towards any particular part of the body, so as to occasion there a tumour, attended with heat. When the humours were deposited in a flower and more gradual way, the old medical writers used to say, that the tumour was produced by congestion.

FLUXION, in the Newtonian Analysis, denotes the velocity with which a flowing quantity is increased by its generative motion; by which it stands contradistinguished from fluent or the flowing quantity, which is gradually, and indefinitely increasing, after the manner of a space which a body in motion describes.

Or, a fluxion may be more accurately defined, as the magnitude by which any flowing quantity would be uniformly increased in a given portion of time, with the generating celerity at any proposed position, or instant, supposing it from thence to continue invariable.

Thus, if the point $m$ move from $A$, and generate the right line $Am$, (Plate VII. Analysis fig. 1.) and the celerity at $R$ be such as would be sufficient, supposing it to continue uniform from that point, to describe the line $Rr$ in the given time; then $Rr$ represents the fluxion of the variable line $A m$ in that position. The rectangle $A S$, $Sg$, 2 may be conceived to be generated by the parallel motion of the invariant line $m n$ between $A F$ and $B g$; and since $R r$ is the fluxion of $A m$, the rectangle $R r S$ will be the space which would be uniformly described by $m n$, whilst $A m$ would be uniformly increased by $m r$, and it is, therefore, the fluxion of the generated rectangle $A B S R$. Farther, if the curve line $A m$, $m f$, 3 be generated by the parallel motion of $m n$, considered as variable, and $R r$ be the fluxion of $A m$, the rectangle $R r S$ would be uniformly generated with the celerity, with which it begins to be generated, and with which the space $A m$ is increased in the position $R s$, when the length and velocity of $m n$ are supposed to continue invariable from that position, and, therefore, agreeably to the definition, will be the fluxion of the generated space $A m$.

From this definition it appears, that the fluxions of quantities are, always, as the celerities by which the quantities themselves increase in magnitude.

Mr. Simpson observes, that there is an advantage in considering fluxions, not as mere velocities, but as the magnitudes which those velocities would, uniformly, generate in a given finite time; the imagination is not here confined to a single point, and the higher order of fluxions are rendered much more easy and intelligible. And though Sir Isaac Newton defines fluxions to be the velocities of motions, yet he hath recourse to the increments or moments generated in equal particles of time, in order to determine those velocities, which he afterwards teaches us to expand by finite magnitudes of other kinds. Simpson’s Fluxions, vol. 1. prof. p. 6, and p. 7, &c.

FLUXIONS, Method of, is the arithmetical and analysis of fluxions and fluents, or flowing quantities.

Foreigners usually define the method of fluxions as the arithmetic, or analysis, of infinitely, or rather indefinitely, small variable quantities; or the method of finding an infinite, or indefinitely small quantity, which, being taken an infinite number of times, becomes equal to a given quantity.

Sir I. Newton, and after him, the English authors, call these indefinitely small quantities moments; considering them as the momentary increments, or decrements, of variable quantities, e. g. of a line considered as generated by the flux
FLUXIONS.

flux of a point, or of a surface generated by the flux of a line.

Accordingly, the variable quantities are called fluent, or flowing quantities; and the method of finding either the fluxion, or the fluent, the method of fluxions.

M. Leibnitz considers the same infinitely small quantities as the differences, or differentials, of two quantities; and calls the method of finding these differences the differential calculus. (See Calculus.) Each of these ways of considering and denominating, has its advantages, which the retainers to this or that method strenuously affect.

Flowing quantities, i.e. such as, in the genesis of figures by local motion are continually increasing and diminishing, are certainly very properly denominated fluents; and as all figures may be conceived as so generated, the infinitely small increments or decrements of such quantities are very naturally denominated fluxions.

Beside this difference in the name, there is another in the notation.

Sir I. Newton expresses the fluxion of a quantity, as $x$, by a dot placed over it, as $\dot{x}$; and M. Leibnitz expresses his differential of the same $x$, by prefixing a $d$, as $dx$; each of which methods of notation has likewise its advantage.

Setting aside these circumstances, the two methods are the same.

The method of fluxions is one of the greatest, most subtle, and sublime discoveries of this, or, perhaps, of any age: it opens a new world to us, and extends our knowledge, as it were, to infinity; it carries us beyond the bounds that seemed to have been preferred to the human mind, at least infinitely beyond those to which the ancient geometry was confined.

The history of this important discovery, as fresh as it is, is a little dark and embroiled. Two of the greatest men of this age do both of them claim the invention, viz. I. Newton, and M. Leibnitz; and nothing can be more glorious for the method itself, than the zeal wherewith the partisans of either side have asserted their respective title.

To give the reader a just view of this noble dispute, and of the pretensions of each party, we shall lay before him the origin of the discovery, and mark where each claim commenced, and how it was supported.

The first time the method made its appearance in public, was in 1684, when M. Leibnitz gave the rules thereof in the Leipsic Acts of that year; but the demonstrations he kept to himself. The two brothers, the Bernoullis, were previously struck with it, and found out the demonstrations, though very difficult; and published the calculus with surpassing success.

However, M. Leibnitz began to propose his differential method in a letter, dated 21 Jan. 16, 5, in which he exactly pursues Dr. Barrow's method of tangents, published in 1677, and Sir I. Newton communicated his method of drawing tangents to Mr. Collins, in a letter dated 16 Dec. 1672; which letter, together with another dated 13 June 1676, was sent to M. Leibnitz by Mr. Oldenburgh, in 1676. So that there is a communication that he might avail himself of the information contained in these letters, and other papers transmitted to him. But also if he, before the publication of his own letter, containing the hint of his differential method, had sufficiently appeared that Sir I. Newton had invented his method before the year 1669, and that he actually made use of it in his Compendium of Analysis and Quadrature of Curves before that time. His attention seems to have been directed thereto, even before the plague which happened in London 1665, and 1666, when he was about twenty-three years of age; and, therefore, there is no foundation for the hint suggested by the authors of the Encyclopaedia Art. Differentiel, that Sir Isaac borrowed the differential method from Dr. Barrow.

This is all we hear of it, till the year 1687, when Sir Isaac Newton's admirable Principia came forth, which is almost wholly founded on the same calculus.

The common opinion, at that time, was, that Sir Isaac, and M. Leibnitz, had each invented it about the same time; and what co.ined it was, that neither of them made any mention of the other; and that, though they agreed in the substance of the thing, yet they differed in their ways of conceiving; called it by different names, and used different characters.

In effect, M. Leibnitz's character was supposed, by foreigners, to be somewhat more commodious than that of Sir Isaac Newton; accordingly, the method soon spreading itself, throughout Europe, M. Leibnitz's character went with it; by which means the geometricians were insufficiently accustomed to look on him as the sole, or principal inventor.

The two great authors themselves, without any seeming concern, or dispute, as to the property of the invention, enjoyed the glorious prospect of the progress continually making under their auspices, till the year 1699, when the peace began to be disturbed.

M. Fatio, in a treatise "Of the Line of swift Fluxions," declared, that he was obliged to own Sir Isaac Newton as the first inventor of the differential calculus, and the first by many years; and that he left the world to judge whether M. Leibnitz, the second inventor, had taken anything from him. This precise distinction between first and second inventor, with the suspicion it insinuated, raised a controversy between M. Leibnitz, supported by the editors of the Leipsic Acts, and the English geometricians, who declared for Sir Isaac Newton. Sir Isaac himself never appeared on the scene; his glory was become that of the nation; and his adherents, warm in the cause of their country, needed not him to animate them.

Writings succeeded each other; but slowly on either side; probably on account of the distance of places; but the controversy grew still hotter and hotter; till, at length, it came to such pass, that in the year 1711, M. Leibnitz complained to the Royal Society, that Dr. Keill had accused him of publishing the method of fluxions invented by Sir Isaac Newton, under other names and characters. He informed, that nobody knew better than Sir Isaac himself, that he had found nothing from him; and required, that Dr. Keill should publicly disavow the ill construction which might be put on his words.

The society here applied to as a judge, appointed a committee to examine all the letters, papers, that had passed among the several mathematicians relating to the point; and, after a strict examen of all the evidence that could be presented, gave in their report to this purpose: That M. Leibnitz was in London in 1693, and had a correspondence with Mr. Collins, by means of Mr. Oldenburgh; that he returned from Paris to Leipsic; and that he returned from London, and Amsterdam, in the year 1711, when the dispute was carried to such a state of the difference, that the Leipsic Academy, after the 2nd June, 1711, was a great matter of the 3rd July, of another letter, written by Sir Isaac Newton, in the year 1712, and published, in which the same circumstances were communicated to him, and the same was answered. M. Leibnitz, on his part, proposed to communicate that letter, but an answer which, after the first method of fluxions was extremely established, the controversy would be better decided. The
of his sagacity into the whole matter: and that Sir I. Newton had even invented his method before the year 1669, and, of consequence, fifteen years before M. Leibnitz had given any thing on the subject in the Leipsic Acts." And thence they concluded, that Dr. Keill had not at all injured M. Leibnitz in what he had said.

The society printed this cenasure of theirs, together with all the pieces and materials relating thereto, under the title of "Commerciuni Epistolica de Analyte Promota," Lond. 1712. This book was carefully distributed through Europe, to vindicate the title of the English nation to the discovery; for Sir Isaac, as already hinted, never appeared in it: whether it were that he trusted his honour with his compatriots, who were zealous enough in the cause; or whether it were that he was even superior to the glory thereof.

M. Leibnitz and his friends, however, could not shew the same indifference: he was accused of a theft; and the whole Commerciium Epistolica either express it in terms, or intimates it. Soon after its publication, a broad sheet was printed, at Paris, in behalf of M. Leibnitz, then at Vienna. It is written with great zeal and spirit; and maintains, boldly, that the method of fluxions had not preceded that of differences: and even intimates, that it might have been taken from it. The detail of the proofs, on each side, would be too long, and could not be underlined without a large comment, which must enter into the deep and geometry.

M. Leibnitz had begun to work upon a Commerciium Epistolicum, in opposition to that of the Royal Society; but he died before it was completed.

A second edition of the Commerciium Epistolicum was printed at London in 1722; where Sir Isaac Newton, in the preface, account, and annotations, which were added to that edition, particularly answered all the objections which M. Leibnitz and M. Bernouilli were able to make since the Commerciium first appeared in 1712. See also Raphson's Hill. Fluxion. From the last edition of the Commerciium, and the various original papers contained in it, it evidently appears that Sir Isaac Newton had discovered his method of fluxions many years before M. Leibnitz's pretensions.

It must be owned, that there are strong presumptions in favour of M. Leibnitz: presumptions, we mean, that he was no plagiarist: for that Sir Isaac Newton was the first inventor, is past all dispute; his glory is secure; the reasonable part, even among the foreigners, allow it: and the question is only, whether M. Leibnitz took it from him, or fell upon the same thing with him; for, in his "Theory of Abstract Notions," which he dedicated to the Royal Academy, 167, before he had been any thing of Sir Isaac Newton's, he already supposes infinitely small quantities, some greater than others; which is one of the great principles of the system.

The doctrine consists of two parts, viz. the Direct method of fluxions, called also Calculus differentialis; and the Inverse method of fluxions, or Calculus integralis. The latter is directly opposite to the former, and is a sequel of it: both of them are adopted into the new geometry, and make reigning methods therein.

The first depends from finite, to infinite; the latter advances from infinitely small, to finite: the one de-compounds a magnitude; the other re-establishes it.

The foundation of the direct method of fluxions amounts to this problem: the length of the space described being continually (that is at all times) given, to find the velocity at any time proposed.

The foundation of the inverse method of fluxions amounts to this problem; the velocity of the motion being continually given, to find the space described by it at any time proposed.

Direct method of fluxions.—All finite magnitudes are here conceived to be resolved into infinitely small ones, supposed to be generated by motion, as a line by the motion of a point, a superflicus by a line, and a solid by a superflicus; and they are the elements, moments, or differences thereof.

The art of finding these infinitely small quantities, or the velocities by which they are generated, and of working upon them, and discovering other infinite quantities, by their means, makes the direct method of fluxions.

What renders the knowledge of infinitely small quantities of such signal use and extent is, that they have relations to each other, which the finite magnitudes, whereof they are the infinitesimals, have not.

Thus, e. g. in a curve, of any kind whatever, the infinitely small differences of the ordinate and absciss have the ratio to each other, not of the ordinate and absciss, but of the ordinate and subtangent; and, of consequence, the absciss and ordinate alone being known, give the subtangent unknown; or, which amounts to the same, the tangent itself. See the Inverse method of fluxions.

The method of notation in fluxions, introduced by the inventor, Sir I. Newton, is thus: The variable, or flowing quantity, to be uniformly augmented, as suppose the absciss of a curve, he denotes by the final letters a, x, y, z, and their fluxions by the same letters with dots placed over them, thus, x, y, z. And the initial letters a, b, c, d, &c. are used to express variable quantities.

Again, if the fluxions themselves are also variable quantities, and are continually increasing, or decreasing, he considers the velocities with which they increase, or decrease, as the fluxions of the former fluxions or second fluxions; which are denoted by two dots over them, thus, x x, y x, z x. After the same manner one may consider the augment, and diminutions of these, as their fluxions, also; and thus proceed to the third, fourth, fifth, &c. fluxions which will be noted thus, x x x, x x y, x x z, &c. We may observe, in general, that the fluxions of all kinds and orders whatever, are contemporaneous, or such as may be generated together, with their respective celerities, in one and the same time.

Lastly, if the flowing quantity be a curved, as so = a - b; he notes its fluxion, \[ y = \frac{d}{dx} (a - b) \]; if a fraction \( \frac{x}{y} \) he notes it, \( \frac{x}{y} \). Vide Wallis's Algebra, p. 392; and Oper. vol. ii. See Fluxent.

The chief scope and business of fluxions is, from the flowing quantity given, to find the fluxion; for this we shall lay down one general rule, as stated by Dr. Wallis, and afterwards apply and exemplify it in several cases. "Multiply each term of the equation separately by the several indices of the powers of all the flowing quantities contained in that term; and in each multiplication change one root or letter of the power into its proper fluxion; the aggregate of all the products connected together by their proper signs, will be the fluxion of the equation desired."

The application of this rule will be contained in the following
FLUXIONS.

Following cases. 1. To express the fluxions of simple variable quantities, as already mentioned, you need only put the letter, or letters, which express them, with a dot over them: thus, the fluxion of $x$ is $\dot{x}$, and the fluxion of $y$ is $\dot{y}$, and the fluxion of $x + y + u + z$, is $\dot{x} + \dot{y} + \dot{u} + \dot{z}$, &c.

2. To find the fluxions of the products of two or more variable or given quantities multiply the fluxion of each simple quantity by the factors of the products, or the product of all the reals and connect the last products by their proper signs: then the sum, or aggregate, is the fluxion sought.

Thus, the fluxion of $xy$, is $\dot{x}y + x\dot{y}$. For let two right lines, $DE$ and $FG$, move parallel to themselves from two other right lines, $BA$ and $BC$, (Plate VII. Analysis, fig. 4) and generate the rectangle $DF$. Let them always intersect each other in the curve $BHR$, and let $Dd$ of $\dot{e}$ and $Ff$ of $\dot{g}$ be the fluxions of the sides $BD$ and $BF$; and draw $dm$ and $fn$ parallel to $DH$ and $FH$. The fluxion of the area $BDF$ (see the beginning of this article) is $m\dot{y} + x\dot{r}$, and that of the area $BDF$ in $x$ or $x$, and therefore the fluxion of the whole rectangle $EF = x\dot{y} + y\dot{u} + y\dot{u} + u\dot{v} + u\dot{v} + v\dot{r}$; for if $x$ be put $= u$, then $y\dot{u} + u\dot{v} = y\dot{x} + x\dot{y}$; but $x = u = 1$ and $\dot{x} = \dot{u}$. $y\dot{x} + y\dot{y} + y\dot{y} + y\dot{y}$, by substitution, will be $= y\dot{x} + y\dot{y} + y\dot{y} + y\dot{y}$. And the fluxion of $x + y + z$ is $\dot{x} + \dot{y} + \dot{z}$ (the common product being $x\dot{y} + y\dot{u} + u\dot{v} + v\dot{r}$ and the fluxion of $a + b + c - d - e - f$, the fluxion of $a\dot{b} + \dot{b}e + d\dot{e} + b\dot{d} + e\dot{a} + a\dot{e}$).

3. To find the fluxion of a fraction. — Multiply the fluxion of the numerator by the denominator, and from this product subtract the fluxion of the denominator drawn into the numerator; this will be the numerator, and the square of the denominator will be the denominator of the fraction expressing the fluxion of the given fraction.

Thus, the fluxion of $\frac{x}{y}$ is $\frac{\dot{x}y - xy\dot{y}}{y}$. For suppose $\frac{x}{y} = z$, then will $x = yz$, which equal quantities must have equal fluxions; therefore $\dot{x} = \dot{y}z + \dot{z}y$, and $x - z = \dot{z}y$; and dividing all by $y$, $\frac{\dot{x} - \dot{z}y}{y}$. (because $\frac{x}{y} = z$) $\frac{\dot{x} - \dot{z}y}{y} - \frac{\dot{y}z - \dot{z}y}{y} = \frac{\dot{x}y - xy\dot{y}}{y}$, wherefore this last is the fluxion of the fraction $\frac{x}{y}$. $\dot{z}$, because $\dot{z}$ will be equal to the fluxion of $\frac{x}{y}$.

And the fluxion of $\frac{a}{x}$ will be $\frac{-a\dot{x}}{x}$; for the constant quantity $a$ having no fluxion, there can be no product of the fluxion of the numerator into the denominator, as there would have been, had $a$ been $x$, $z$, or any other variable quantity.

4. To find the fluxion of a power. — Multiply the fluxion of the root by the exponent of the power, and the product by that power of the same name, whose exponent is less by unit than the given exponent; and likewise by the variable quantity and co-efficient, if there be any.

Thus, the fluxion of $x^2$ will be $2x\dot{x}$; for $x = 2^x$. But the fluxion of $x^2 = x\dot{x} + 2\dot{x}x$, &c. and the fluxion of $x$ will be $2^x$. Then $\dot{x}$ will be $8x\dot{x}$, &c. and that of $\dot{x}$ will be $25^x\dot{x}$, &c. that of $y = 12^x\dot{x}$ &c.

Or, if $m$ expresses the index of any power, as suppose $x^m$, its fluxion will be $x^m\dot{x}$.

If the power be produced from a binomial, &c. as suppose $x + y$, or $x^2 + 2xy + y^2$, its fluxion will be $2x\dot{x} + 2x\dot{y} + 2y\dot{y}$.

If the exponent be negative, as suppose $\frac{1}{x}$, or $-x$, its fluxion will be $-\dot{x}$.

Or, if you would do it by way of fraction, $\frac{m}{x^m}$. (for the square of $x^n$ is $x^{2n}$), $-\frac{m}{x^m}$: $\dot{x} = -\frac{m}{x^m} \cdot \dot{x}$ as before; =, removing $x^{m-2}$ to the denominator, by changing the sign of the exponent, $\frac{m}{x^{m-2}}$.

If the power be imperfect, i.e. if its exponent be a fraction, as suppose $\sqrt[n]{x^{m-1}}$; or in the other notation $\frac{m}{n}$, suppose $\frac{m}{n} = z$; then if you raise each member to the power of $n$, it will stand thus, $x^m = z^n$: the fluxion of which will be, by this general rule, $m\dot{x} = n\dot{x}\frac{n}{n-1}$. $\dot{x}$.

Wherefore $\dot{z}$ will be $\frac{m}{n\dot{x}}$, (by dividing both parts by $n\dot{z}$) and $m\dot{x} = n\dot{z}$; or $\frac{m}{n}$: $\dot{x}$; putting, instead of $z^{n-1}$, its value $x\frac{m-n}{m}$, and the above expression will become $\frac{m}{n} \dot{x} = \frac{m}{n} \dot{x} = \frac{m}{n} \dot{x}$.

$\frac{m-n}{m} = \frac{m}{n} \dot{x} \frac{m-n}{m}$; or, more briefly, according to the rule, the fluxion of $\sqrt[n]{x^n}$ or $\frac{m}{n}$ will be $\frac{m}{n} \dot{x} = \frac{m}{n} \dot{x}$, &c.

5. To find the fluxions of several quantities. — Suppose it required to find the fluxion of $\sqrt[2]{x^n - x^n}$, or $\sqrt[n]{x^n - x^n}$.

Suppose $\frac{2}{2} = \frac{x screamed when you reach $2^x$, then $2^x = 2^x$, and consequently $r^x = x^z$; &c. and by division, $\frac{r^x}{z} = \dot{z}$; (by substitution) $\frac{r^x}{z} \dot{z} = \dot{z}$, to the fluxion of $\sqrt[2]{r^x - x^n}$.

Or, by the preceding rule, the fluxion of $\sqrt[2]{r^x - x^n}$, will be $\frac{r^x}{z} \dot{z} = \frac{r^x}{z} \dot{z} \dot{r} = \frac{r^x}{z} \dot{r} \dot{z}$, &c. See Power.
If it be required to find the fluxion of \( a y - x^2 \); put \( z = \frac{a}{y - x} \), and \( y = \frac{a}{x} \), and \( a y - 2 x = z \).

Multiplying by \( z \), \( 3 a y - 6 x = \frac{a}{x} = \frac{z}{3} \), and therefore, \( 3 a = \frac{z}{x} = \frac{a}{x} \).

Substituting \( a y - x^2 = \frac{a}{x} \) equal to \( \frac{3 a^2}{a} y^2 - 6 a x^2 y \), and \( x^2 = 6 a x^2 y + 2 a x^2 x = 6 a x^2 y + 2 a x^2 x = 6 a x^2 y \), and \( x^2 = 6 a x^2 y \).

To find the fluxion of quantities compounded of rational and several quantities: Let us be required to find the fluxion of \( b x^2 + a x^2 + a^2 x + \sqrt{x^2 + a} \), and \( \sqrt{x^2 + a} = \frac{a^2}{x} \). Then the given quantity is \( \frac{a^2}{x} \), and the fluxion thereof is \( \frac{\sqrt{x^2 + a}}{x} \).

To find the fluxion of a logarithm: The fluxion of the hyperbolic logarithm of any quantity is equal to the fluxion of that quantity divided by the quantity itself; e.g., the fluxion of the hyperbolic logarithm of \( x \) is \( \frac{1}{x} \); for let

\[ L, Q, \text{Plate VII. Analysis, fig. 5.} \]

be an hyperbola, whose asymptotes are \( O \) and \( S \), whose parameter is \( A \), \( \frac{AO}{1} \); draw an ordinate \( P M \) parallel to \( A L \), and the space \( A P M L \) will be the hyperbolic logarithm of the line \( O P \). Therefore, the fluxion of the space \( A P M \) will be equal to the fluxion of \( x \) the hyperbolic logarithm of the line \( O P \). But the fluxion of this line, \( O P \) being \( x \), and \( P M = \frac{1}{x} \), \( y \), \( O P \). \( A O \). \( L : A : P M \) by the nature of the curve; \( i.e., \( x \) : \( i : 1 ; \ y = \frac{1}{x} \),

therefore \( y = \frac{x}{x} \).

Then, from the nature of the logarithms, the hyperbolic logarithm of \( 10 \) (viz. 2,30258, &c.) is to the common logarithm of \( 10 \) (viz. 1) as the hyperbolic logarithm of any number \( n \) to the common logarithm of the same number \( n \); \( i.e., \) \( L \) being made \( 2,30258 \), &c., \( L \). \( 1 : 1 \) the hyperbolic logarithm of \( n \); common logarithm of \( n \); and therefore \( L \). \( 1 : 1 \); the fluxion of the hyperbolic logarithm of \( n \); the fluxion of the common logarithm of \( n \); \( i.e., \) \( L \). \( 1 : 1 \); \( \frac{x}{x} \), \( n \). \( L \), which is the fluxion of the common logarithm of \( n \); or because \( \frac{x}{x} = 0.43429 \), &c., the modulus of the Bragon or common form of logarithms, if \( \frac{x}{x} = \frac{M}{n} \), the fluxion of the common logarithm of \( n \) (viz. \( \frac{x}{x} \)) will be \( \frac{x}{x} \times M \); cr, the fluxion of the hyperbolic logarithm of any number multiplied by \( M \) or

\[ 0.43429 \text{, &c.} \]
FLUXIONS.

The base of a parallelogram multiplied by the infinitely small element of its altitude, gives an infinitely small parallelogram; which is the element of the finite parallelogram, and is repeated an infinity of times therein, i.e. as many times as there are points in the height of the parallelogram.

To have the finite parallelogram, therefore, by means of its element, the element must be multiplied by the altitude; which is the inverse method of fluxions, re-ascending from the infinitely small quantity to the finite.

Such a circuit of infinitesimals, it is true, would be impertinent, in so simple a cafe; but when we have to do with surfaces terminated by curves, the me hod then becomes necessary, or at least superior to any other.

Suppose, e.g., in a parabola, the space included between two infinitely near ordinates, an infinitely small portion of the axis, and an infinitely little arc of the curve; it is certain, this infinitely small surface is no parallelogram; since the two parallel ordinates which terminate it on one side are not equal; and the arc of the curve, opposite to the little portion of the axis, is frequently neither equal nor parallel thereto; and yet this surface, which is no parallelogram, may be considered, in the strictest geometry, as if it really were one, because it is infinitely small; and the error, of consequence, infinitely little, i.e. none.

So that, to measure it, there needs nothing but to multiply an ordinate of the parabola by the infinitely small portion of the axis corresponding thereto. Thus we have the element of the whole parabola; which element being raised, by the inverse method, to a finite magnitude, is the whole surface of the parabola.

This advantage, so peculiar to the geometry of infinites, of being able, without any error, to treat little arcs of curves as if they were right lines; curvilinear spaces, as if rectilinear ones, &c. enables it not only to go with more ease and readiness than the ancient geometry to the same truths, but to reach a great number of truths which were inaccessible to the other.

Its operations, in effect, are more easy, and its discoveries more extensive; and simplicity and univercity are its distinguishing characters.

The preceding observations are more properly applicable to the method of infinites and indivisibles than to the Newtonian method of fluxions, in which magnitudes of various kinds are capable of increase, not by a repeated accession of parts, but by a continued motion or flux. See the sequel of this article.

Fluxion, given, to find the flowing quantity belonging to any. — To have the doctrine of the inverse method correspond and keep pace with that of the direct, we will apply it in the same cases.

1. In the general, to express the variable quantity of a fluxion, there needs nothing but to write the letters without the dots, or to substitute the variable or flowing letter for its fluxion. Thus, the fluxions of \( x, y, z \), are \( \dot{x}, \dot{y}, \dot{z} \).

2. To find the fluent of a compound fluxional expression consisting of the products of two or more flowing quantities drawn into their fluxions; or which consists of the fluxion of each quantity drawn into the other, or product of the rest of the quantities.

Multiply the flowing quantities together; and the product is the fluent required. E.g., the fluent of \( xy + x \dot{y} \) is \( \dot{x}y + x\dot{y} + \dot{x}y + \dot{x}y \); is \( xy + a + b \), &c.

3. To find the fluent of a fraction. The following rule will serve in many cases. Divide the last term in the numerator by the fluxion of the negative square root of the denominator; then divide this quotient by the affirmative square root of the denominator for the required fluent.

Thus, the fluent of \( \frac{\dot{x}y - \dot{x}}{y} \) is \( \frac{\dot{x}y}{y} \).

4. To find the fluent of an expression compounded of different fluxional terms connected together by the signs + and —

Find the separate flucents of the different terms, and connect them together by the signs of their respective fluciones.

Thus, the fluent of \( ax + x \dot{y} + x^2 - \frac{\dot{x}y - \dot{x}}{y} \) is \( a + \dot{x} + \dot{y} \).

5. To find the flowing quantity belonging to the fluxion of any power, either perfect or imperfect. Take the fluxional letter, or letters, out of the equation; then augment the index of the fluxion by 1, or multiply; lastly, divide the fluxion by the index of its power so increased by unity.

Thus, suppose \( 3x^2 \) proposed; by taking away \( x \), will be \( 3x \); and by increasing its index by unity, it will be \( 3x^3 \); then dividing it by \( 3 \), its new (augmented) index, the quotient will be \( x^2 \); the flowing quantity required.

Again, the fluent of \( \frac{x^3}{m} \) will be \( \frac{x^2}{m} \). In compound fluxional expressions, if the fluxional part is equal, or in an invariable ratio to the fluxion of the quantity under the vinculum, the fluent may be had by adding 1 to the index of the power, and dividing by the index of the quantity under the vinculum drawn into the power thus increased. E.g., the fluent of \( x + x^\frac{1}{3} \times 3 \dot{x} + 6x \dot{x} \) is \( x + x\dot{1} + \frac{3\dot{x} + 6x\dot{x}}{3\dot{x} + 1} = x + \dot{x} \); the fluent of \( \frac{a + c\dot{z} + m\dot{z}}{n\dot{z} + m + 1} \times d\dot{z} \) is \( \frac{a + c\dot{z} + m\dot{z}}{n\dot{z} + m + 1} \); and the fluent of \( a + z^{n-1} \) is \( a + z^{n-1} + 1 \).

By these methods the fluent is found when fluxion is given; and the rules are derived from those of the direct method; as the rules in division and evolution in algebra are deduced from those of multiplication and involution. As when a fluent consists of a variable and invariable part, the latter does not appear in the fluxion; so when any fluxion is proposed, it is only the variable part of the fluent that can be derived from it. If \( \dot{a} \) represent any fluxion that may be proposed, the variable part of the fluent will be equal to \( \dot{a} \); for supposing \( y \) to be any variable quantity, if \( x + y \) could represent the fluent of \( x \), then \( x + y \) would be equal to \( \dot{a} \), and \( \dot{a} = \dot{x} \), or \( y \) would be invariable, against the supposition. But supposing \( K \) to represent any invariable quantity, then \( x + K \) may generally represent the fluent of \( x \). If it be required to find such a fluent of \( x \) as shall vanish when \( x \) is supped to vanish, it can be no other than \( x \); and if it be required that the fluent should vanish when \( x \) is equal to any given quantity, \( a \), then by supposing \( x + K \) to vanish when \( x \) becomes equal to \( a \); we shall have \( a + K = a \); or \( K = - a \); whence the fluent is \( x = a \). In the same manner, the fluent of \( - \dot{x} \) may be generally represented by \( K \). When a fluxion that is
propose coincides with any of those which were deduced from their fluents in the preceding articles, the variable part of the fluent required must coincide with that which was there proposed. As division in algebra leads us to fractions, and evolutions to roots; so the inverse method of fluotions leads us often to quantities that are not known in common algebra, and that cannot be expressed by common algebraic symbols. Maclaurin’s Flux. art. 355.

We cannot here pretend to enter into a detail of the rules of the inverse method of fluotions. We shall only observe in general, that a fluxion being proposed, its fluent may sometimes be found accurately in algebraic terms; but this is far from being always possible; and recourse must sometimes be had to a converging series. Thus, if \( \frac{\alpha}{x} \) were proposed, the variable part of the fluent is found by adding only to the exponent of the power, dividing by the exponent thus increased, and by the fluxion of the root; that is, the variable part of the fluent of \( \frac{\alpha}{x} \) will be

\[
\frac{\alpha x^m + \frac{\alpha}{x}}{n + 1} = x^n.
\]

But in many cases this fluent requires the addition or subtraction of some constant quantity to render it complete, which can only be known from the nature of the problem under consideration: e.g., the fluent of \( \frac{\alpha}{x} \) may be either represented by \( \frac{\beta}{x} \) or by \( \frac{\beta}{x} + \gamma \), because being constant, the fluxion of \( x^n + a \), as well as of \( x^n \), is \( \frac{\beta}{x} \). To find this variable quantity that must be added or subtracted, is to correct the fluent. In order to do this, the best way is to consider how much the variable part of the fluent, first found, differs from the truth, in that particular circumstance when the required quantity which the whole fluent ought to express, is equal to nothing; then, that difference added to or subtracted from the variable part, as occasion requires, will give the fluent truly corrected. For, since the difference of two quantities flowing with the same celerity, or having equal fluxions, is either nothing at all, or constantly the same, the difference in that circumstance will likewise be the difference in all other circumstances; and, therefore, being added to the other quantity, or subtracted from the greater, both become equal at the same time: e.g., \( x = a \) to \( x + \frac{a}{x} \), the fluent will be \( y = \frac{a^2}{x} \); if \( x = a \), \( a^2 \frac{x}{2} \) vanishes, because \( x \) is also \( a \), and the fluent needs no correction.

2. Let \( y = a + \frac{a}{x} \times \frac{x}{2} \); and \( y \) will be equal \( \frac{a^2}{x} \) ; but when \( x \) is equal to \( a \), \( a + \frac{a}{x} \) becomes \( \frac{a^2}{x} \); and, therefore, \( \frac{a^2}{x} \) always exceeds \( y \) by \( \frac{a}{x} \), and the fluent properly corrected will be \( y = \frac{a^2}{x} + \frac{3 a^2}{2} + a \times \frac{x}{2} + \frac{x}{4} \). But this fluent may be found without correction, by expanding \( a + \frac{a}{x} \) in the original equation, which will become \( y = a^2 x^2 + 3 a^2 x^3 + \frac{3 a^2 x^4}{2} + a x + \frac{x}{4} \). Let \( y = \frac{a^2}{x} \times \frac{x}{2} \); then \( y = \frac{-a^2}{x} \), and \( y \) being

\[
\left(1 - \frac{a^2}{x^2} \right) \text{ becomes } = - \frac{a^2}{3} \text{, therefore } - \frac{a^2}{3}.
\]

This is too little by \( \frac{a^2}{3} \); and the fluent corrected will be \( y = \frac{a^2}{3} - \frac{a}{x} \) ; &c.

In the solution of other problems, the value of \( y \) will be equal to nothing, when that of \( x \) is equal to any given quantity \( a \). E.g., Let \( y = a + \frac{a}{x} \), and \( y = \frac{a}{x} \), but then

\[
y = \frac{a}{x} \text{ is } \frac{a}{x}, \text{ by supposition; therefore the corrected fluent will be } \frac{a^2}{x^2} \text{. 2. Let } y = - \frac{a}{x} \text{, then } y = - \frac{a}{x} \text{, which corrected becomes } y = \frac{a^2}{x^2}.
\]

If the proposed fluent were \( a + \frac{a}{x} \), we cannot find its fluent by the rule above given; however, we may throw the fluent into an infinite series by dividing \( a \) by \( x \) in the usual method, and we shall find the quotient

\[
\frac{a}{x} = \beta = \frac{a x^2 + 3 a x^4 + \frac{3 a^2 x^6}{2} + \frac{a^2 x^8}{4}}{n + 1}, \text{ &c. hence } \frac{a}{a} = \beta + \frac{a x^2 + 3 a x^4 + \frac{3 a^2 x^6}{2} + \frac{a^2 x^8}{4}}{n + 1}, \text{ &c.}
\]

Now the fluent of each term of this series may be found by the foregoing rule; and therefore the fluent of \( \frac{a}{x} \frac{a^2}{x} \) will be expressed by the series

\[
\frac{a^2}{x} + \frac{a^2}{x^3} + \frac{3 a^2 x^4}{2} + \frac{v}{4}, \text{ &c. which may be of use for determining the fluent when } x \text{ is very small in respect to } a \text{, because in that case, a few terms at the beginning of the series will be nearly equal to the value of the whole. But it often happens that the series deduced in this method converges too slowly, as to be of little or no ufe. Or, because the fluent of the hyperbolic logarithm of any quantity is equal to the fluent of that quantity divided by the quantity itself, the fluent of } \frac{a}{a} \text{ will be } \frac{a}{a} \frac{a}{a} \times \text{ hyp. log. of } a \times \text{. For the fluent of } a + x \text{ is } x \text{, which divided by } a - x \text{ is } \frac{a}{a} \text{. See Maclaurin’s Tr. of}
\]


Mathematicians do not always immediately recur to infinite series, when it does not appear that a fluent can be aligned in a finite number of algebraic terms. The arcs of a circle, and hyperbolic areas or logarithms cannot be aligned in algebraic terms, but have been computed with great exactness by several methods. By these with algebraic quantities, any segments of conic coëfficients, and the arcs of a parabola, are easily measured; and when a fluent can be aligned by them, this is considered as the second degree of resolution. When it does not appear that a fluent can be measured by the areas of conic sections, it may however be measured in some cases by their arcs, and this may be considered as the third degree of resolution. If it does not appear that a fluent can be aligned by the arc of any conic section (the circle included), it may however be of some use to align the fluent by an area or are of some other figure, that is easily constructed or described; and it
is often important, that the proposed fluxion be reduced to a proper form, in order that the series for the fluxion may not be too complex, and that it may not converge at too slow a rate.

We may, therefore, constitute three orders or classes of fluxions. First, such as can be accurately assigned in finite terms by common algebraic expressions. Secondly, those which can be reduced to circular arcs and logarithms. Thirdly, such as can be assigned by hyperbolic or elliptic arcs. The first two classes (considering triangles and circles as conic sections) may therefore be measured by the areas of conic sections: and the third class by their perimeters, or lines that bound them.

The fluents of \( \frac{x}{\sqrt{1 + x^2}} \) are of the first class; that of \( \frac{x}{\sqrt{1 + x^2}} \), or of \( \frac{x}{1 + x^2} \), of the second; but the fluents of \( \frac{x}{\sqrt{1 + x^2}} \), \( \frac{1 + x^2}{\sqrt{1 + x^2}} \), \( \sqrt{1 + x^2} \), \( \frac{x}{\sqrt{1 + x^2}} \), and \( 1 + x^2 \) are of the third class, and as far as has appeared hitherto, cannot be reduced to the former. See Maclaurin's Fluxions. Look ii. chap. iii. art. 755. 798, &c.

It is to be observed, as to the fluent of \( \frac{x}{\sqrt{1 + x^2}} \) or of \( \frac{x}{1 + x^2} \), that it does not appear possible to represent them by any hyperbolic and algebraic quantities. But by affixing an elliptic arc likewise, they may be constructed. See Maclaurin, lib. cit. art. 802.

Solikewise to represent the fluent of \( \frac{x}{\sqrt{1 + x^2}} \) or of \( \frac{x}{1 + x^2} \), we must have recourse to both the hyperbolic and elliptic arcs. Maclaurin, lib. cit. art 805.

The fluent of \( \frac{x}{\sqrt{1 + x^2}} \) is assignable by the arcs of conic sections, when \( r \) is an integer number; that is, by right lines, when \( r \) is equal to four, or to any multiple of 4; by circular and parabolic arcs (reducible to logarithms) with right lines, when \( r \) is any other even number; by arcs of an equilateral hyperbola with right lines, when \( r \) is any number of the series 3, 7, 11, 15, &c. and by arcs of the hyperbolas and right lines, with arcs of an ellipse, that has its excentricity equal to the second axis, when \( r \) is any of the numbers 1, 3, 5, 7, 9, 13, &c. See Maclaurin, libid. art. 809. See ELEMENT and FUNCTION.

We presume, upon the whole, that few will be so scrupulous as to deny the Newtonian doctrine of fluxions to be intelligible and accurately demonstrated. But on the other hand it must be confessed, that the introduction of the notions of motion and velocity, which are mechanical, seems not to have thrown any light on this part of geometry. The consideration of the limiting ratios of variable quantities, and that of the limiting polygons of curves, so it requires no other knowledge but what depends on the common properties of number and magnitude, so it seems, in all respects, the most clear and unexceptionable manner of considering the subjects treated of in the higher geometry. An eminent mathematician seems to declare himself of this opinion, when he says, that quadrature by limiting polygons is one of that kind which requires no other knowledge but what depends on the common properties of number and magnitude; and so may serve as an influence to shew, that no other is requisite for the establishment of principles for arithmetic and geometry; a truth which, though certain in itself, may perhaps seem doubtful from the nature and tendency of the present inquiries in mathematics. For among the moderns none have thought it necessary, for the investigation of the relations of quantities, to have recourse to very hard hypotheses; such as that of numbers infinite and indeterminate; and that of magnitudes in \( \frac{a}{b} \), existing in a potential manner, which are actually of no signification. And others, whose names are truly to be revered, on account of their great and singular inventions, have thought it requisite to have recourse even to principles foreign to mathematics, and have introduced the consideration of efficient causes and physical powers, for the production of mathematical quantities; and have spoken of them, and used them, as if they were a species of quantities by themselves. Vide Machin, in Phil. Trans. N. 447.

The elements of the doctrine of fluxions have been delivered by its great author in so concise a manner, as to give occasion to one of the most ingenious writers of the last age to represent it as founded on inconceivable principles, and full of fable reasonings. This author in a letter, under the title of the "Analysis," published in the year 1733, has been at great pains to convince his readers that the objects, principles, and inferences of the modern analysis by fluxions, are not more difficultly conceived, or more evidently deduced, than religious mysteries and points of faith. He says he does not controvert the truth of the conclusions, but only the logic and method of mathematicians. He asks how they demonstrate, what objects they are conversant with, and whether they conceive them clearly; what principles they proceed upon, how found they may be, and how they apply them; declaring himself not concerned about the truth of the theorems, but only about the way of coming at them, whether it be legitimate or illegitimate, clear or obscure, scientific or tentative. He considers the conclusions not in themselves, but in their premises; not as true or false, useful or insignificant, but as derived from such principles, and by such inferences. And for as much as it may seem an unaccountable paradox, that mathematicians should deduce true propositions from false principles, he right in the conclusion, and yet err in the premises, he endeavours particularly to explain how this may come to pass, and how error may bring forth truth, though it cannot bring forth science. His solution of the paradox is, that in the application of the method of infinitesimals and fluxions, two errors are committed, which being equal and contrary, destroy each other. We cannot enter into a detail of all he says on this and many other heads, nor of all that has been said on the other side, in defence of the method of fluxions; and of its inventor, Sir Isaac Newton. An answer to the "Analysis," under the title of "Geometry no Friend to Infinitesimals," appeared very early under the name of Philosophica Catechismi, supposed to be Dr. Jurin; a second, by the same hand, in defence of the first, intitled, "The Minute Mathematician, or the Free-thinker no Jovil Thinker," published in 1755; a Discourse of Fluxions, by Mr. Robins, issued in 1755 (see his Collection of Tracts, by Wilfon, vol. ii.); a Treatise of Sir Isaac Newton's, with a commentary by Mr. Colton; and several other pieces were published on this subject; particularly a very full and excellent treatise of fluxions, by
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by Mr. Maclaurin, late professor of mathematics in the university of Edinburgh, containing not only a most distinct account of the principles of fluxions, but also of the chief discoveries in geometry, and mathematical philosophy of this age. The curious may find an elegant account of this treatise in the Philosophical Transactions, No. 4, 8, 469.

We premise that Mr. Maclaurin's demonstrations are sufficient to satisfy the most scrupulous; it would exceed the bounds of our design to insert them at length here; but we cannot omit mentioning what seems necessary to explain and illustrate the notion of fluxions; and the principles on which this method of computation is founded. In the doctrine of fluxions, magnitudes are conceived to be generated by motion; and the velocity of the generating motion is the fluxion of the magnitude. Lines are supposed to be generated by the motion of points; the velocity of the point that describes the line, is its fluxion, and measures the rate of its increase or decrease. When the motion of a point is uniform, its velocity is constant, and is measured by the space described by it in a given time; when the motion varies, the velocity at any term of the time is measured by the space which would be described in a given time, if the motion was to be continued uniformly, from that term, without any variation. And this is analogous to the general doctrine of powers, or may be considered as a particular application of it. As a power which acts continually and uniformly is measured by the effect that is produced by it in a given time; so the velocity of a uniform motion is measured by the space that is described in a given time. If the action of the power vary, then its exertion at any rate of the time is not measured by the effect that is produced after that term in a given time, but by the effect that would have been produced if its action had continued uniform from that term; and in the same manner, the velocity of a variable motion at any given term of time is not to be measured by the space that is actually described after that term in a given time, but by the space that would have been described, if the motion had continued uniformly from that term. If the action of a variable power, or the velocity of a variable motion, may not be measured in this manner, they must not be susceptible of any measurement at all. When it is supposed that a body has some velocity or other at any term of the time, during which it moves, it is not therefore supposed, that there can be any motion in a term, limit, or moment of time, or in an indivisible point of space; and as velocity is always measured by the space that would be described by it, continued uniformly for some given finite time, it cannot surely be said, that geometers pretend to conceive motion or velocity without regard to space or time, as the author of the Analyst often suggests. This is a short view of the nature and tendency of the doctrine of fluxions, which we shall now proceed to explain more particularly.

We have already said that lines may be conceived as generated by the motion of points; in like manner surfaces may be conceived as generated by the motion of lines; solids, by the motion of surfaces; angles, by the rotation of their sides; the flux of time being supposed to be always uniform. The velocity with which a line flows, is the same as that of the point which is supposed to describe or generate it. The velocity with which a surface flows, is the same as the velocity of a given right line; that, by moving parallel to itself, is supposed to generate a rectangle which is always equal to the surface. The velocity with which a solid flows, is the same as the velocity of a given plain surface, that, by moving parallel to itself, is supposed to generate an erect prism or cylinder that is always equal to the solid. The velocity with which an angle flows, is measured by the velocity of a point, that is supposed to describe the arch of a given circle, which always subtends the angle, and measures it. In general, all quantities of the same kind (when we consider their magnitude only and abstract from their position, figure, and other affections) may be represented by right lines, that are supposed to be always in the same proportion to each other as the quantities. They are represented by right lines in this manner in Euclid's Elements, in the general doctrine of proportion, and by right lines and figures in the data of that accurate geometer. In this method likewise, quantities of the same kind may be represented by right lines, and the velocities of the motions by which they are supposed to be generated, by the velocities of points moving in right lines. All the velocities we have mentioned are measured, at any term of the time of the motion, by the spaces which would be described in a given time, by these points, lines, or surfaces, with their motions continued uniformly from that term.

A fluxion being the velocity with which a quantity flows at any term of the time while it is supposed to be generated, is therefore always measured by the increment or decrement that would be generated in a given time by this motion, if it was continued uniformly from that term without any acceleration or retardation; or it may be measured by the quantity that is generated in a given time by an uniform motion, which is equal to the generating motion at that term.

Time is represented by a right line that flows uniformly, or is described by an uniform motion; and a moment or termination of time is represented by a point or termination of that line. A given velocity is represented by a given line, the same which would be described by it in a given time. A velocity that is accelerated or retarded, is represented by a line that increases or decreases in the same proportion. The time of any motion being represented by the base of a figure, and any part of the time by the corresponding part of the base; if the ordinate at any point of the base be equal to the space that would be described, in a given time, by the velocity at the corresponding term of the time continued uniformly, then any velocity will be represented by the corresponding ordinate. The fluxions of quantities are represented by the increments or decrements, described in the foregoing paragraph, which measure them; and instead of the proportion of the fluxions themselves, we may always substitute the proportion of their measures.

When a motion is uniform, the spaces that are described by it in any equal times are always equal. When a motion is perpetually accelerated, the spaces described by it in any equal times that succeed after one another, perpetually increase. When a motion is perpetually retarded, the spaces that are described by it in any equal times that succeed after one another, perpetually decrease.

It is manifest, conversely, that if the spaces described in any equal times are always equal, then the motion is uniform. If the spaces described in any equal times that succeed after one another perpetually increase; the motion is perpetually accelerated; for it is plain, that if the motion was uniform for any time, the spaces described in any equal parts of this time would be equal; and if it was retarded for any time, the spaces described in equal parts of this time that succeed after one another would decrease; both of which are against the supposition. In like manner it is evident, that a motion is perpetually retarded, when the spaces that are described in any equal times that succeed after one another, perpetually decrease. The following axioms are as evident as that a greater or
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Axiom; 3. The space described by a retarded motion is less than the space which would have been described in the same time if the motion had not been retarded, but had continued uniform from the beginning of the time.

Axiom 4. The space described by a motion while it is retarded is greater than the space which is described in an equal time by the motion that remains after that retardation, continued uniformly.

From these axioms, general theorems concerning motion, of use in the doctrine of fluxions, may be demonstrated. Thus, when the spaces described by two variable motions are always equal, or in a given ratio, the velocities are always equal, or in the same given ratio; and conversely, when the velocities of two motions are always equal to each other, or in a given ratio, the spaces described by those motions in the same time are always equal, or in that given ratio; that when a space is always equal to the sum or difference of the spaces described by two other motions, the velocity of the first motion is always equal to the sum or difference of the velocities of the other motions; and conversely, that when a velocity is always equal to the sum or difference of two other velocities, the space described by the first motion is always equal to the sum or difference of the spaces described by the two other motions. See Mr. Macaulay's Treatise of Fluxions, book i. chap. 1.

The main point, in the method of fluxions, is to obtain the fluxion of the rectangle, or product of two indeterminate quantities, since from thence may be derived rules for all other products and powers, be the co-efficients, or the indices, what they will, integers, or fractions, rational or surds; according to the manner of sir Isace Newton, in the second lemma of his second book of Principles.

Mr. Macaulay has therefore been very full in establishing this point; and after what he has said, we presume that no reasonable objection can lie either against the clearness and distinctness of the notion of fluxions, or against the truth of the principles, or accuracy of the demonstrations by which their measures are determined. We cannot here impart his demonstrations at length; but as many readers may, perhaps, be desirous of seeing the argument contracted into a narrow compass, we shall here give a summary of it, from the Philosophical Transactions, N° 468, p. 331, or Martin's Abridg. vol. viii. p. 31, &c.

A triangle that has two of its sides given in position, is supposed to be generated by an ordinate moving parallel to itself along the base. When the base increases uniformly, the triangle increases with an accelerated motion, because its successive increments are trapezia, that continually increase; therefore if the motion with which the triangle flows, was continued uniformly from any term for a given time, a less space would be described by it than the increment of the triangle, which is actually generated in that time by axiom 1; but a greater space than the increment which was actually generated in an equal time preceding that term, by axiom 2. And hence it is demonstrated, that the fluxion of the triangle is accurately measured by the rectangle contained by the corresponding ordinate of the triangle, and the right line which measures the fluxion of the base. The increment which the triangle acquires in any time, is resolved into two parts; that which is generated as a consequence of the motion with which the triangle flows at the beginning of the time, and that which is generated in consequence of the acceleration of this motion for the same time. The latter is justly regulated in measuring that motion (or the fluxion of the triangle at that term), but may serve for measuring its acceleration, or the second fluxion of the triangle. The motion with which the triangle flows, is similar to that of a body descending in free spaces by an uniform gravity, the velocity of which, at any term of the time, is not to be measured by the space described by the body in a given time, either before or after that term, because the motion continually increases, but by a mean between these spaces.

When the sides of a rectangle increase or decrease with uniform motions, it may be always considered as the sum or difference of a triangle and trapezium; and this fluxion is derived from the last proposition. If the sides increase with uniform motions, the rectangle increases with an accelerated motion; and in measuring this motion at any term of the time, a part of the increment of the rectangle that may be determined, is rejected, as generated in consequence of the acceleration of that motion.

Those who have well understood what precedes will not be at a loss to conceive, that the fluxions of a curvilinear area, whether generated by an ordinate moving parallel to itself, or by a radius revolving round a given centre, may be determined by demonstrations of the same kind. When the ordinates of the figure increase, the increment of the area may be resolved in like manner into two parts, one of which only is to be retained in measuring the fluxion of the area, the other being rejected as generated in consequence of the acceleration of the motion with which the figure flows.

What has been hitherto said will set the difference between the notion of fluxions and that of infinitesimals in a clear light. Fluxions may always be represented by finite quantities. The supposition of an infinitely little magnitude is too bold a postulate for such a science as geometry. Nor have authors accounted explicitly for the truth and perfect accuracy of the conclusions derived from this consideration. When they determine what is called the difference, but more accurately the fluxion of a quantity, they tell us, they reject certain parts of the element, because they become infinitely less than other parts. But this is no proper reason, not only because a proof of this nature may leave some doubt as to the accuracy of the conclusion, but because it may be demonstrated that these parts ought to be neglected by them at any rate, or that it would be an error to retain them. If an accountant, that pretends to a scrupulous exactness, should tell us, he had neglected certain articles, because he found them to be of small importance; and it should appear that they ought not to have been taken into consideration by him on that occasion, but belong to a different account, we should approve his conclusions as accurate, but not his reasons. See Macaulay's Treatise of Fluxions in the preface, and book i. chap. 12, where the method of infinitesimals is expressly treated of. Mr. Macaulay, in the first part of his treatise, considers fluxions in a merely geometrical form, and has demonstrated the value of the method with all possible accuracy and rigour; but as the great improvements made by this doctrine are chiefly to be ascribed to the facility, conciseness, and great extent of the methods of computation, or the algebraic part, it is necessary to add some account of these methods also.
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Any quantities produced from each other by an algebraic operation, or whose relation is expressed by any algebraic form, being supposed to increase or decrease together, some will be found to increase or decrease by greater differences, or at a greater rate, others by less differences, or at a less rate; and while some are supposed to increase or decrease at one constant rate by equal successive differences, others increase or decrease by differences that are always varying. These rates of increase or decrease may be determined by comparing the velocities of points that always describe lines proportional to the quantities as before mentioned, but they may also be determined without having recourse to such supposition, by a jujt restoring from the simultaneous increments or decrements themselves.

When a quantity A increases by differences equal to \( a \), \( 2A \) increases by differences equal to \( 2a \), and manifestly increases or decreases at a greater rate than \( A \) in the proportion of \( 2a \) to \( a \) or \( 2 \) to \( 1 \); and if \( m \) and \( n \) be invariable, \( \frac{m \Delta A}{n} \) increases or decreases by differences equal to \( \frac{m}{n} \), and therefore at a greater or less rate than \( A \) in proportion as \( \frac{m}{n} \) is greater or less than \( a \), or \( m \) is greater or less than \( n \). This seems to be easily conceived, without having recourse to any other considerations than the relation of the differences by which the quantities increase or decrease. In order therefore to avoid figurative expressions in the algebraic part, it will be proper to substitute in the place of the definition and axioms before mentioned, others that are rather of a more general import, but are perfectly consistent with them: Thus,

"Fluxions of quantities are any measures of their respective rates of increase, or decrease, while they vary or flow together.

There can be no difficulty in determining these measures when the quantities increase or decrease by successive differences, that are always in the same invariable proportion to each other. While \( A \) by increasing becomes equal to \( A + a \), or by decreasing equal to \( A - a \), \( 2A \) becomes equal to \( 2A + 2a \), or to \( 2A - 2a \); and as \( 2A \) increases or decreases at a greater rate than \( A \) in the proportion of \( 2a \) to \( a \); so the fluxion of \( A \) being supposed equal to \( a \), the fluxion of \( 2A \) must be equal to \( 2a \).

In the same manner the fluxion of \( \frac{m}{n} \times A \), or of \( \frac{m}{n} \) 

\[ A \neq a, \text{ (supposing } m, n, \text{ and } e \text{ to be invariable) is } \frac{m}{n} \times a; \]

and since \( m \) may be to \( n \) in any invariable ratio, a quantity may be always assigned that shall increase or decrease at a greater or less rate than \( A \) in any proportion, or that shall have its fluxion greater or less than the fluxion of \( A \) in any ratio. In such cases, the ratio of the fluxions and that of the differences, by which the quantities increase or decrease, are the same.

But while \( A \) is supposed to increase at a constant rate by any equal successive differences, if \( B \) increase or decrease by differences that are always varying, \( B \) cannot be said to increase or decrease at any one constant rate; and it is not so obvious how the fluxion of \( A \) being supposed equal to its increment \( a \), the variable fluxion of \( B \) is to be determined. It cannot be supposed that the fluxions and differences are always in the same proportion in this case; but it is evident that if \( B \) increase by differences, that are always greater than the equal successive differences by which \( \frac{m}{n} \times A \) increases, it cannot increase at a less rate than \( \frac{m}{n} \times A \); and it cannot increase at a greater rate than \( \frac{m}{n} \times A \), while its successive differences are always less than those of \( \frac{m}{n} \times A \). The fluxion of \( A \) being still represented by \( a \), the fluxion of \( B \) therefore cannot be less than \( \frac{m}{n} \times a \) in the former case, or greater than \( \frac{m}{n} \times a \) in the latter. The following propositions are consequences of this, and will enable us to determine at what rate \( B \) increases, when its relation to \( A \) is known.

The successive values of the root \( A \) being represented by \( A - a, A - 2a, \) &c., which increase by any constant difference \( a \), let the corresponding values of any quantity produced from \( A \), by any algebraic operation (or that has a dependence upon it so as to vary with it) be \( B - b, B - 2b, \) &c. Then if the successive differences \( b, b, \) &c., of the latter quantity always increase, how small soever \( a \) may be, then \( B \) cannot be said to increase at a greater rate than \( b \); or to a small rate as any quantity that increases uniformly by equal successive differences greater than \( b \), or at a small rate as any quantity that increases uniformly by equal successive differences less than \( b \). In like manner, if the relation of the quantities is such, that the successive differences \( b, b, \) &c. continually decrease; then \( B \) cannot be supposed to increase at the same rate as a quantity that increases uniformly by equal successive differences greater than \( b \), or less than \( b \).

Therefore the fluxion of \( A \) being supposed equal to the increment \( a \), the fluxion of \( B \) cannot be greater than \( b \) or less than \( b \), when the successive differences \( b, b, \) &c. continually increase; and cannot be greater than \( b \) or less than \( b \), when these successive differences always decrease.

In the same manner, if the latter quantity decrease while the former increases, and its successive values be \( B + b, B + 2b, \) &c. then if the decrements \( b, b, \) &c. continually increase, \( B \) cannot be said to decrease at a greater rate as a quantity that decreases uniformly by equal successive differences greater than \( b \), or at a small rate as a quantity that decreases uniformly by equal successive differences less than \( b \). Therefore in this case the fluxion of \( A \) being supposed equal to \( a \), the fluxion of \( B \) cannot be greater than \( b \) or less than \( b \). And in the same manner if the successive decrements \( b, b, \) &c. continually decrease, the fluxion of \( B \) cannot be greater than \( b \), or less than \( b \). Vide Maclaurin's Flux. book ii. chap. i. tom. i. p. 579. seq.

As the fluxions of quantities are any measures of the respective rates, according to which they increase or decrease; so it is of no importance how great or small those measures are, if they be in the just proportion or relation to each other. Therefore if the fluxions of \( A \) and \( B \) may be supposed equal to \( a \) and \( b \) respectively, they may be likewise supposed equal to \( \frac{1}{3} \) \( a \) and \( \frac{1}{3} \) \( b \), or to \( \frac{m}{n} \times \frac{m}{n} \) and \( \frac{m}{n} \times \frac{m}{n} \).

Prop. 1. The fluxion of the root \( A \) being supposed equal to \( a \), the fluxion of the square \( A^2 \) will be equal to \( 2A \times a \).

To demonstrate this, let the successive values of the root
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be $A - u, A, A + u$, and the corresponding values of the square will be $AA = 2A u + u^2, AA, A + 2A u + u^2$, which increase by the differences $2 A u + u, 2 A u + u^2$; &c. and because those differences increase, it follows from what has been said, that if the fluxion of $A$ be represented by $u$, the fluxion of $AA$ cannot be represented by a quantity that is greater than $2 A u + u$, or $u$s than $2 A u + u u$. This being premised, suppose, in the proposition, that the fluxion of $A$ is equal to $a$; and if the fluxion of $AA$ be not equal to $2 A a$, let it be first be greater than $2 A a$ in any ratio, as that of $2 A + a$ to $2 A$, and consequently equal to $2 A a + a u$. Suppose now that $u$ is any increment of $A$ less than $a$, and because $a$ is to $u$ as $2 A a + a u$ is to $2 A u + u a$, it follows, that if the fluxion of $A$ should be represented by $u$, the fluxion of $AA$ would be represented by $2 A u + u a$, which is greater than $2 A u + u$. But it has been shown, that if the fluxion of $AA$ be represented by $u$, the fluxion of $AA$ cannot be represented by a quantity greater than $2 A u + u$. And there being contradictory, it follows, that the fluxion of $A$ being equal to $a$, the fluxion of $AA$ cannot be greater than $2 A a$. If the fluxion of $AA$ can be less than $2 A a$, when the fluxion of $A$ is supposéd equal to $a$, let it be less than in any ratio of $2 A - a$ to $2 A$, and therefore equal to $2 A a - a a$. Then because $a$ is to $u$ as $2 A a - a u$ is to $2 A u - a u$, which is less than $2 A u - u a$ (as before) it follows, that if the fluxion of $A$ was represented by $u$, the fluxion of $AA$ would be represented by a quantity less than $2 A u - u a$, against what has been shown. Therefore the fluxion of $A$ being supposéd equal to $a$, the fluxion of $AA$ must be equal to $2 A a$.

The fluxion of $A$ and $B$ being supposéd equal to $a$ and $b$, respectively, the fluxion of $A + B$ will be $a + b$, the fluxion of $A + B$, or of $A A + 2 A B + B B$, will be $2 A + B + a + b$, or $2 A a + 2 b B a + 2 A b$, by the law of addition. The fluxion of $A A + B B$ is $2 A a + 2 b B a + 2 A b$, by the same; consequently the fluxion of $2 A B$ in $2 A a + 2 b B a + 2 A b$, and the fluxion of $A B$ is $B a + A b$. Hence if $P$ be equal to $A B$, and the fluxion of $P$ be $p$, then $p$ will be equal to $B a + A b$, and dividing by $B$, or $A$, we find $p = A + B$. When any one of the quantities decreases, its fluxion is to be considered as negative.

The rule for finding the fluxion of a power is usually deduced from the binomial theorem of Sir Isaac Newton. But as this theorem, though easily found by induction, is not so easy to demonstrate, it is proper to proceed upon a principle, the truth of which may be shewn from the first algebraic elements, with more facility and perspicuity. This principle is, that if $n$ be any integer number, and the sum of the terms $E^m, E^m + F^m, E^m + F^m$, &c continued till their number be equal to $n$, be multiplied by $E - F$, the product will be $E^n - F^n$. But the terms being formed by dividing coiningly from the index of $E$, and adding it to the index of $F$, the last term will be $F^n$. The product of the sum of the terms multiplied by $E$ will be $E^n + F^n + F^n + F^n$, &c.

If $n$ be integers, their sum multiplied by $- F$ gives $E^n - F^n - F^n - F^n$; and the sum of these two products is $E^n - F^n$. Supposing $E$ to be greater than $F$, $E^n - F^n$ will be less than $n E^n - 1 \times F - 1$, but greater than $n E^n - 1 \times E - F$. For each of the terms $E^n, E^n - F, E^n - F$, is greater than the succeeding term in the same ratio that $E$ is greater than $F$, and $E^n - F$ is the greatest term; consequently the number of terms being equal to $n$, $E^n - F$ is greater than their sum, and $n E^n - 1 \times E - F$ is greater than their fluxions multiplied by $E - F$, or (by the last paragraph) greater than $E^n - F^n$. Because the last term $F^n$ is less than any preceding term, $n E^n - 1 \times E - F$ is less than the fluxion of the terms multiplied by $E - F$, or less than $E^n - F^n$. When $n$ is any integer positive number, the root $A$ being supposed to increase by any equal successive differences, the successive differences of the power $A^n$ will continually increase. For let $A = a, A, A + a$ be any successive values of the root, and $A = a, A, A + a$ will be the corresponding values of the power. But $A + a - A^a$ is greater than $n A^n - a$, as appears by substituting in the last paragraph $A + a$ for $E, A$ for $F, a$ for $E - F$. In like manner, $n A^n - a$ is greater than $A^n - A^a$. Therefore $A + a - A^a$ is greater than $A^n - A^a$, and the successive differences of the power continually increase.

Prop. II. The fluxion of the root $A$ being supposed equal to $a$, the fluxion of the power $A^n$ will be $n a A^n - 1$. For if the fluxion of $A^n$ can be greater than $n a A^n - 1$, let the excess be equal to any quantity $r$; suppose $a$ equal to the excess of $\sqrt[n]{A^n} + r$ above $A$, and consequently $A + a = A + \sqrt[n]{A^n} + r$, $n a A^n + a$. Then $n a A^n + a$ will be equal to $n a A^n - 1 + r$, the fluxion of $A^n$. Let $u$ be any increment of $A$ less than $a$; and because $a$ is to $u$ as $n a \times A^n + u$ to $n a \times A^n + a$, it follows (from what has been said) that if the fluxion of $A$ be now represented by the increment $u$, the fluxion of $A^n$ will be represented by $n a \times A^n + u$, which is greater than $n a \times A^n + u$; and this last is itself greater than $A^n - A^n - A$. But when the successive values of the root are $A = u, A, A + u$, those of the power are $A = u, A$, $A + u$, the successive differences of which continually increase: consequently if the fluxion of $A$ be represented by $u$, the fluxion of $A^n$ cannot be represented by a quantity greater than $A^n + u - A^a$, or less than $A^n - A - u$. And these being contradictory, it follows, that when the fluxion of the root $A$ is supposéd equal to $u$, the fluxion of $A^n$ cannot be greater than $n a A^n - 1$; if it can be less than $n a A^n - 1$, let it be equal to $n a A^n - 1$, or (by supposing $u$ equal to $A = \sqrt[n]{A^n} + r$) then $n a \times A^n - a$. Then $n a \times A^n - a$.
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posed equal to \( a \), the fluxion of \( A^n \) must be equal to \( n a A^{n-1} \).

Prop. III. The fluxion of \( A \) being supposed equal to \( a \), the fluxion of \( A^n \) will be \( \frac{m}{n} a \times A^{n-1} \).

First, let the exponent \( \frac{m}{n} \) be any positive fraction what
soever, suppose \( \frac{m}{n} A^n = K \); consequently \( A^{m-n} = K^{n} \); and the fluxion of \( K \) being supposed equal to \( k \), \( ma A^{m-1} = n k K^{n-1} \), and \( k \), or the fluxion of \( A^{n-1} \), will be equal to \( \frac{ma K}{n K^{n-1}} = \frac{m}{n} a \times A^{n-1} \). When \( \frac{m}{n} \) is negative, let it be equal to \(-r \); and suppose \( A^{-r} = K \), or \( s = A^{-K} \), then taking the fluxions, \( r A^{-r-1} a K = \frac{m}{n} a \times A^{n-1} \).

Prop. IV. Supposing \( P \) to be the product of any factors \( A, B, C, D, E, \) \&c, and the fluxions of \( P, A, B, C, \) \&c, respectively equal to \( p, a, b, \) \&c, then will \( \frac{dp}{P} = \frac{a}{A} + \frac{b}{B} + \frac{c}{C} + \frac{d}{D}, \) \&c.

Let \( Q \) be equal to the product of all the factors of \( P \), the first \( A \) excepted, that is, suppose \( P = A \cdot Q \). Suppose \( R \) equal to the product of all the factors, the first two, \( A \) and \( B \) excepted; that is, let \( P = A \cdot B \cdot R \), or \( Q = B \cdot R \). In the same manner, let \( R = C \cdot S \cdot D \cdot T \), and so on.

Then the fluxions of \( Q, R, S, T, \) \&c, being supposed respectively equal to \( q, r, s, \) \&c, it follows that \( \frac{dp}{P} = \frac{a}{A} + \frac{q}{Q} = (\text{because } q = \frac{b}{B} + \frac{r}{R}) \frac{a}{A} + \frac{b}{B} + \frac{r}{R} = (\text{because } r = \frac{c}{C} + \frac{s}{S}) \frac{a}{A} + \frac{b}{B} + \frac{c}{C} + \frac{s}{S} = (\text{because } s = \frac{d}{D} + \frac{t}{T}) \frac{a}{A} + \frac{b}{B} + \frac{c}{C} + \frac{d}{D} + \frac{t}{T} \), and so on. Therefore \( \frac{dp}{P} \) is equal to the sum of the quotients when the fluxion of each factor is divided by the factor itself.

If the factors be supposed equal to each other, and their number be equal to \( n \), then \( P = A^n \), and by the last proposition \( \frac{dp}{P} = \frac{n}{n} a \); consequently \( p = \frac{n}{n} A = n a A^{n-1} \), as was before demonstrated.

Prop. V. If \( P = A \cdot B \cdot C, \) \&c, and the fluxions of the respective quantities be expressed by the small letters \( p, a, b, c, \) \&c, as before, then \( \frac{dp}{P} = \frac{a}{A} + \frac{b}{B} + \frac{c}{C} - \frac{k}{K} - \frac{l}{L} - \frac{m}{M} \), \&c.

For \( PKLM, \) \&c, \( = ABC, \) \&c, and \( \frac{dp}{P} = \frac{k}{K} + \frac{l}{L} + \frac{m}{M} \), \&c. what may by transposition \( \frac{dp}{P} = \frac{a}{A} + \frac{b}{B} + \frac{c}{C} - \frac{k}{K} - \frac{l}{L}, \) \&c. Maclaurin, ibid.

The notation we have hitherto used is the same as for Isaac Newton's, in the second lemma of the second book of his Principles. But it is generally more convenient to distinguish fluxions from other algebraic expressions, and in such manner, that the second and higher fluxions may be represented so as to preserve the original fluent in view. Hence sir Isaac Newton, in his last method, represented variable or flowing quantities by the final letters of the alphabet, as \( x, y, z; \) their first, second, \&c. fluxions, respectively, by \( x, y, z; \) \&c. But as this doctrine has been contested and represented by the author of the Analytical, as inconceivable and sophistical, we thought it proper more fully to explain and demonstrate the principles thereof, from Mr. Maclaurin's excellent treatise on this subject.

It is to be observed, that the fluxions of powers are commonly delivered in an algebraic form; but this is not necessary. The same may be done geometrically, by supposing a series of lines in geometric progression, the first term of which is variable. Then if the second term be supposed to increase uniformly, all the subsequent terms will increase with an accelerated motion. The velocities of the points that describe those lines being compared, it may be demonstrated from common geometry, that the fluxions of any two terms, are in a ratio compounded of the ratio of those terms, and of the ratio of the numbers that express how many terms precede them respectively in the progression. Thus, if \( A, B, C, D, E, \) \&c. represent any lines in geometric progression, the first term \( A \) of which is variable, then will the fluxion, for instance, of \( E \) be to the fluxion of \( D \) as \( 4 \) \( E \) is to \( 3 \) \( D \), and the fluxion of \( E \) will be to the fluxion of \( B \) as \( 4 \) \( E \) to \( B \). The analogy between powers in algebra and lines in geometric progression is sufficiently known. Thus \( A \) being variable may be called unity, or \( 1 \); let \( B = x \), then will \( C = x^2, D = x^3, E = x^4 \), \&c. and consequently the fluxion of \( E \), if \( x \) is variable, will be to the fluxion of \( B \) or \( x \), as \( 4 \) \( x^4 \) is to \( x \), or as \( 4 \) \( x^4 \) is to \( 1 \). Therefore if the fluxion of \( x \) be expressed by \( x \), the fluxion of \( x^4 \) will be expressed by \( 4x^3 \), according to the common algebraic method of expression. Vide Mr. Maclaurin's Flux. book i. chap. 6. See also the Preface of the Rep. of Let. Oct. 1735, p. 248, 249, \&c.

If the fluxion of \( B \), or the second term of the progression be variable, every term of the progression will have fluxions of as many degrees as there are terms that precede it in the progression. And the increment of any term, generated in a given time, may be resolved into as many parts as it has fluxions of different orders; and each part may be conceived to be generated in consequence of its respective fluxion. Hence fluxions of all orders may be illustrated and measured.

As to the higher order of fluxions, it is to be observed, that when a motion is accelerated or retarded continually, the velocity may itself be considered as a variable or flowing quantity, and may be represented as a line that increases or decreases continually. When a velocity increases uniformly, so as to acquire equal increments in equal times, its fluxion is measured by the increment which is generated in any given time. In this case the velocity is represented by a line that is described by an uniform motion; and its fluxions by the constant velocity of the point that describes the line, or by the space which this point describes in a given time. When a velocity is not accelerated uniformly, but acquires increments in equal times, that continually increase or decrease, then its fluxion at any term of the time is not measured by the increment which it actually acquires.
acquires, but by that which it would have acquired, if its acceleration had been continued uniformly from that term for a given time. And in the same manner, when a motion is retarded continually, the quantity by which it would be diminished in a given time, if its retardation was continued uniformly for any term, measures its fluxion at that term. While the point M describes the line E, let the point Q describe the line I', so that I Q may be always equal to the space that would be described by the motion of M, if it was continued uniformly for a given time. Then I Q shall always represent the velocity of M, and the velocity of the point Q shall represent the fluxion of the velocity of M; which therefore is measured, at any term of the time, by the space which would be described by Q, with its motion at that term continued uniformly for a given time. The velocity of M is the fluxion of E M; and therefore the velocity of Q represents the fluxion of the fluxion of E M. (See the beginning of this article.) Thus, when a fluxion of a quantity is variable, it may be considered itself as a fluent, and may have its fluxion which is called the second fluxion of that quantity. This may also have its fluxion, which is called the third fluxion of the first fluent; and motions may be easily conceived to vary in such a manner, as to give ground for admitting second fluxions, and those of any higher order. And as the first fluxion of a variable quantity, at any term of the time, is measured by the increment or decrement, which would be produced, if the generating motion was continued uniformly from that term, for a given time; so its second fluxion may be measured by twice the difference between this increment, or decrement, and that which would be produced, if the acceleration, or retardation, of the generating motion was continued uniformly from that term for the same time. Maclaurin, lib. cit. book i. chap. 1. § 70. 75. and chap. 5. 6.

See a farther illustration of second and third fluxions, in the same author (chap. 3, and 4.) deduced from the consideration of the fluxions of solids.

The author of the Analysis has represented the notions of second and third fluxions as inextricable mysteries; and, indeed, when some speak of the velocities of velocities, &c. it is not easy to say what they mean. But it is to be observed, that the first fluxion of any fluent is not the velocity of that fluent, but the velocity of the motion by which the fluent is conceived to be generated. And in like manner, the second fluxion of that fluent is not the velocity of the velocity of this fluent, but the velocity of the motion by which the quantity is generated that always represents its first fluxion; and so of the rest.

When the fluxion of a quantity is variable, it may be considered as a fluent; and its fluxion, which is the second fluxion of the proposed quantity, may be determined by the preceding propositions. Thus the fluxion of A being supposed equal to a, the fluxion of A A is 2 A a; and if A be supposed to increase at an uniform rate, or its fluxion a to be invariable, 2 A a will increase by equal successive differences; consequently its fluxion, or the second fluxion of A A, will be equal to any of these differences, as 2 a A a + 2 A a, or 2 a a. If a be variable, let its fluxion be equal to z, and the fluxion of 2 A a (or second fluxion of A A) will be 2 A a + 2 A z. In the same manner the fluxion of A being constant, the fluxion of A A⁻¹, or the second fluxion of Aⁿ, is n a x n − 1 × Aⁿ−². a, or n × n − 1 × a Aⁿ−²; the fluxion of this, or third fluxion of Aⁿ, is n × n − 1 × n − 2 × a Aⁿ−³, &c. x a Aⁿ−ᵣ, where the factors in the coefficient are to be continued till their number be equal to m. When n is in any integer positive number, the fluxion Aⁿ, of the order n, is invariable and equal to n × n − 1 × n − 2 × n − 3, &c. x a. The quantities that represent the first fluxions of Aⁿ depend on a, which represents the fluxion of A. When A remains of the same value, the first fluxion of Aⁿ is greater or less in the same proportion, as a is supposed to be greater or less; the second fluxion of Aⁿ, is in the duplicate ratio of a; and its fluxion of the order m, is as aᵐ. If a be variable, then the fluxion of A, or the second fluxion of A, be constant, then the fourth fluxion of A A will be constant and equal to 6 a 2, for we found that the second fluxion of A A was 2 a A; the fluxion of this is 4 a 2 + 2 A a, or 6 a a; and the fluxion of this is 60 a². In like manner, the fifth fluxion of A⁻¹ will be constant in this case, and equal to 90. The second differences of any quantity B are the successive differences of its first differences; and as the fluxion B increases when its successive differences increase; so its second differences, or its fluxions of any higher order increase when its second or higher differences increase. If we arrive at differences of any order that are constant, the fluxion of the same order is constant, and is expressed by that difference. Thus, when A is supposed to increase by constant differences equal to a, and its fluxion is supposed equal to a, the second difference of A A (or A + a² - 2 A A + A - a) is 2 a a, which is likewise its second fluxion; and the third difference of A is 6 a², which is its third fluxion. When n is a integer and positive number, the fluxion of Aⁿ of the order n is equal to the fluxion of any of its first differences of the order n − 2, and so on. For the fluxion of A + a² - Aⁿ (one of the first differences of Aⁿ) of the order n - 1 is n × n - 1 × n - 2, &c. x A + a² - Aⁿ - aⁿ⁻² - A x a⁻¹ = n × n - 1 × n - 2, &c. x a⁻¹, where the coefficients are supposed to be continued till their number be n - 1, so that the last term will be the fluxion of A⁻¹ of the order n, in the preceding paragraph. In the same manner the fluxion of A + a² - 2 A A + A - aⁿ⁻² (the second difference of Aⁿ) of the order n − 2, is equal to the fluxion of A + a² - A of the order n − 1, and consequently equal to the fluxion of Aⁿ of the order n. These fluxions are invariable and equal to the last or invariable differences. But in other cases the fluxions of Aⁿ of any order are less than its subsequent differences of the same order, but greater than the preceding differences, as before mentioned. Maclaurin’s Flux. art. 720. 721.

By supposing one of the variable quantities to flow uniformly, it will have no second or higher fluxions, and the higher fluxions depending on it will be expressed in a more simple manner. Thus the fluxion of x being supposed constant, the first fluxion of xⁿ being xⁿ⁻¹ x, its second fluxion will be n × n − 1 × xⁿ⁻² xⁿ⁻¹, and its fluxion of any order m will be n × n − 1 × n − 2 × n − 3, &c. x Aⁿ−ᵣ, where the factors in the coefficient are to be continued till their number be equal to m. The second or higher fluxions of quantities may be found by particular theorems (without computing those of the preceding orders) as may be seen by the last example. See further
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FLY, in Natural History. See Musca; see also Entomology.

FLY, Fire. See Fire-fly.

FLY, Fishing. See Fishing-fly.

FLY, Flower, in Natural History, the name of a small bush-fly, described by Clusius. It is black, and has two fibrous wings, two white eyes, seven yellow spots on the back, and a black one in the middle.

FLY, Harvest. See Harvest.


FLY, Lantern. See Lantern-fly.

FLY, Roff. See Rose.

FLY, Scorpion. See Scorpion-fly.

FLIES, Eggs of. See Eggs.

FLIES, Eyes of. See Eye.

FLIES, Legs of. See Leg.

FLIES, Rings of. See Rings.

FLY, St. Mark, the name of a species of fly, which makes its first appearance every year about St. Mark's day, and is then seen in vast numbers; it is somewhat smaller than the large blue fleet-fly, and has no truck, but a mouth without teeth; notwithstanding this seemingly innocent organization, the creature does great mischief, and every gardener knows the effects of it at one time or other.

FLY, in Mechanics, is an apparatus employed to equalize and regulate the velocity and power of many machines which require such regulation from the inequality either of the moving power, or of the resistence it has to overcome. A fly acts upon the principle that any body, being put in motion with a certain velocity at a certain expense of power, will continue to move until its motion is checked by a resistence equal to its momentum or ham of the power and velocity which first caused its motion. This principle is carried into effect by various forms of the apparatus; the main being generally made to revolve upon a centre, and the parts on the opposite sides of the centre being balanced. Two, four, or any other number of equal weights, placed on the opposite ends of arms or radii which are affixed to an axis, will, if the weights be supposed to touch each other, or a hoop or ring of one piece be fastened, its form will be much improved; and it is now termed a fly-wheel, and is the manner in which the fly is most generally used.

The friction or resistence which the air opposes to any body in motion, and the friction of the pivots which support the axis of a fly-wheel, are considerable deductions from the power communicated to it; so that instead of a fly-wheel gaining power, as some imagine, it requires a constant exertion of power to keep it in motion, even when no other resistence is applied to prevent it. For this reason a mechanic should never introduce a fly-wheel into a machine, unless the advantages to be derived from its action are greater than the actual loss of power it occasions. As an instance, we will suppose a heavy flamer or hammer to be raised by a water-wheel: the action of the water upon the wheel is constant and uniform, and whilst the machine is lifting the hammer, this action is nearly balanced; but the instant the hammer falls, the principal resistence or load to the water-wheel is removed, and the water urges it rapidly forwards, until it meets the hammer again, when it is suddenly checked, and moves with diminished velocity, until it again looses its load.

In such a case as this the fly-wheel is of great service, for in the interval while the resistence to the water-wheel is not in action, it prevents its acceleration, the power of the water-wheel being employed to give a momentum to the fly-wheel; and as soon as the velocity of the water-wheel is at all diminifhed, by the return of its load, the momentum of the fly-acts to carry it forwards, and continue the motion with the same velocity until the momentum is expended in displating the water-wheel. By this time the hammer has fallen, and the water-wheel left at liberty to communicate a new impulse to the fly.

In this, and many other similar cases, the power expended in giving motion to the fly is trifling, compared with what it pretends from complete loss during the interval in which the resistence of the water-wheel is inactive. If the water-wheel had been applied to raising a flamer, the equalization might, have been made by using three or four flapers in place of one, and adapting the machine to raise them successively: by this means, the load being divided and applied continually, the motion would be rendered nearly as uniform as by a fly-wheel, and without its inconveniences.

In this manner in many machines where fly-wheels are introduced, they are not absolutely necessary, as mills, pump mills, &c., where a single machine which only acts in one direction is to be moved, all these might be improved by dividing the load, and causing its parts to act in succession; and for pump mills the double acting pumps may be substituted, to great advantage, in lieu of a single one with a fly-wheel.

It is a great object in constructing flies to form them so as to present the smallest resistence to the air. For this purpose a wheel should always be used, and should be smooth and truly circular without any projecting nuts, &c.; the radii should be made to present a thin edge to the air, and the whole should be made of metal, that the greatest weight may be contained under the smallest surface; and for this purpose, if the section of the ring is a circle, the smallest surface will be exposed to the resistence to the air, the radii should be of an elliptic figure, the narrowest edge meeting the air.

This form of a fly-wheel is used by Messrs. Murray and Wood in the steam engines which they ereft, and in included in a patent they have for steam engines, and have been applied to the steam engines, and is not original, as Mr. Sully gave that form to his watch balances many years ago.

A fly-wheel should be cut in one piece of metal, if it is not too weighty; in which case, the pieces of which it is composed should be melted together in the most solid manner imaginable, lest the centrifugal force of such a large mass, moving with a considerable velocity, should endanger the separation of its pieces. If by any accident the bolts connecting them become loose, or are weakened by rusting, (this failure, which has sometimes happened, is truly dreadful,) the force with which a fragment of the wheel is projected is irresistible; and if it should chance to strike the walls of the building, it would be in danger of total destruction. A method has been lately introduced of putting fly-wheels together, by dovetailing instead of screw-bolts. The arms are fastened into the ring, and the fragments of the ring fastened together by a system of dovetail, which only admit of being put together in one direction, which is contrary to that in which the centrifugal force acts. Proceed on this head will not appear trifles, when it is considered that fly-wheels of 8 and 16 tons in weight in the ring and arms are common in the machinery used for the manufacturing of iron, and their circumference moving at the rate of 300 feet per minute. We have seen one applied to a steam engine of 16 tons in weight, and moving much quicker. The ring is usually in six pieces, of about
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about a ton each, and connected only by a few wrought iron bolts as it revolves. The weight of these pieces, constantly acting in new directions, independent of the centrifugal force, is a severe strain upon the bolts and parts forming the connection.

The mode of calculating the size, weight, and velocity of a fly-wheel, proper to regulate the motion of any given piece of machinery, must be very intricate; though it is not usual for practical mechanics to employ calculation, their fly-wheels being adopted from the proportion of some other similar machine, which is found to answer its purpose. This subject has not been investigated in the elementary works on mechanics that we have seen; though, from its great practical utility, it would well repay the labour of any competent analyst, who would turn his thoughts to the subject.

The fly-wheel only acts when the velocity of the machine is variable: for having naturally a tendency to preserve an uniform velocity in itself, it will tend to move the machine connected with it in the same manner. On this account, it would be absurd to employ a fly-wheel in any machine where the power and resistance are always uniform, or bear the same proportion to each other; hence the motion of any machine, deriving assistance from a fly-wheel, cannot be perfectly regular, as it is only when a change in the velocity of the machine takes place that the fly-wheel has any action, and the power it exerts to continue the motion is greater or less, as the change in velocity of the machine is more sudden or slow.

In rolling mills, where the power which will be required is not to be estimated, and at the same time the resistance to the mill is not in action, a great proportion of the time, a large and heavy fly-wheel is necessary; in this case it acts as a collector of power. If the workman has an extraordinary, large piece of metal to be rolled, he suffers the mill to work without obstruction a few revolutions of the water-wheel, that the fly-wheel may acquire such a velocity as will overcome the resistance to be opposed to it, which is perhaps far beyond the power of the mill to accomplish without such aid.

The coming press, or fly-press, is another example of the same fort. The momentum of a fly, put in motion by a continued action of several seconds, is expended in an instantaneous stroke upon a piece of metal, acting with astonishing power. The fledge hammer may be influenced as a similar case. The power given to the hammer in a certain space of time, is exerted in an infinitely short time, and with proportional power.

In all cases where the moving force is variable, a fly-wheel must be added, unless the resistance can be adapted to vary in the same degree. A man, turning a winch by his hand, or a crank by his feet, can exert three times the power in many positions which he can in others, particularly in the latter case; a fly-wheel is, therefore, of essential service, and the rotative motion obtained from the flemm engine is wholly dependent on the assistance of the fly-wheel.

The fly may be applied to several sorts of engines, whether moved by men, horses, wind, or water; and is of great use in those parts of an engine which have a quick circular motion, and where the power or resistance acts unequally in the different parts of a revolution. In this case the fly, without adding any new force, becomes a moderator, making the motion of revolution almost every where equal and uniform; thus the engine becomes more easily and conveniently acted upon and moved by the impelling force; and this is the only advantage obtained by the fly. The best form of this appendage to machines is that of a wheel or circle, of a proper size, as this will not only be less resisted by the air, but by being continuous, and the weight every where equally distributed through the perimeter of the wheel, the motion will be more easy, uniform, and regular. In this form, the fly is most aptly applied to the perpendicular drill, which it likewise serves to keep upright by its centrifugal force; as also for wheels or common, where the motion is quick; for in pressing upwards from the lower part, a person can exercise a greater power than in thrusting forward in the upper quarter; when, of course, part of his force would be lost, if it were not accumulated and maintained in the equal motion of the fly. Hence, by this application of force, a man may work all day in drawing up a weight of 40 lbs. whereas 30 lbs. would occasion to him greater labour in a day without the fly.

The force of a fly, when joined with the screw, for flushing the image upon coins, may be calculated thus: suppose its two arms to be each fifteen inches long, measuring from the centre of the weights to the axis of the motion, and the weights to be fifty pounds each, and the diameter of the axis prefixed upon the end to be one inch; if every stroke be made in half a second, and the weights describe an half circumference, which will in this case be of four feet, the velocity will at the instant of the stroke be at the rate of eight feet in a second, and, therefore, the momentum eight hundred; but the arms of the fly being as levers, one brachium of which is fifteen inches long, whilst the other, viz. the semi-axis, is but half an inch, we must increase this force thirty times, which will give twenty-four thousand; an immense force, equal to that of a hundred pound weight falling a hundred and twenty feet, or near two seconds in time; or to that of a body of seven hundred and fifty pounds, falling 16 1⁄2 feet, or one second in time.

Some of these engines for coined crown-pieces have the arms of the flies five times as long, and the weights twice as heavy as those here mentioned; so that the effect is ten times greater. Defagustiius. Exper. Philosoph. vol. i. p. 245. 339.

Besides the utility of fly-wheels, as regulators of machinery, they have been employed for accumulating or collecting power. If motion be communicated to a fly-wheel by means of a small force, and if this force be continued till the wheel has acquired a great velocity, such a quantity of motion will be accumulated in its circumference as to overcome resistances, and produce effects, which could never have been accomplished by the original force. So great is this accumulation of power, that a force equivalent to 20 pounds, placed for the space of 37 seconds to the circumference of a cylinder, 20 feet diameter, which weighs 4713 pounds, would, at the distance of one foot from the centre, give an impulse to a much-ball equal to that which it receives from a full charge of gunpowder. In the space of six minutes ten seconds, the same effect would be produced, if the cylinder were driven by a man who constantly exerted a force of 20 pounds at a stroke one foot long. This has been demonstrated by Mr. Atwood in his "Treatise on Rotatory and Linear Motion." This accumulation of power is exemplified in the Sling: and also in the machine for casting, as already stated. Mellor, Watt and Boulton have employed a new kind of fly, called the "Conical Pendulum," for regulating the admission of steam into the cylinder of the steam-engine, which feeds.

Notwithstanding the great advantages of fly-wheels, both as regulators of machines, and collectors of power, their
utility wholly depends upon the position which is assigned them, with respect to the impelled and working points of the engine. This position depends altogether on the structure of the machinery. It may be obviated, however, in general, that where fly-wheels are employed to regulate machinery, they should be near the impelling power. And, when used to accumulate force in the working point, they should not be far distant from it. In hand-mills for grinding corn, the fly is for the most part very injudiciously fixed on the axis to which the winch is attached. It should always be fastened to the upper mill-stone, so as to revolve with the same rapidity. In the first position, indeed, it must equalize the varying efforts of the power which moves the winch, but when it is attached to the turning mill-stone, it not only does this, but contributes very effectually to the grinding of corn. Ferguson's Mechanics, by Brewster, vol. 1.

Fly-press, an instrument of most extensive use in many manufactures for flamping or cutting small articles in metal. It consists of a chisel, punch, or cutting tool, moved by a screw, which is furnished with weights acting as a fly. When these are turned rapidly round, the tool exerts an immense power on any substance subjected to its action. The press is often used without the fly, and is still called, though improperly, a fly-press.

Figs. 1, 2, 3, and 4, of Plate XXVII. (Mechanics) represent a fly-press with its minor parts, such as is in common use in Sheffield in a variety of manufactures, which we shall enumerate in their proper heads. A A A Figs. 1 and 2, is a massive frame of cast-iron, of the dimensions expressed by the drawing and scale annexed. In the upper part of this frame a female screw, or screw-box is fitted, and the screw B passes through it. The top of the screw is fixed to a curved handle a b c, furnished with a heavy weight c, which acts as a fly, when the handle is turned round by a workman sitting before a bench or table, on which the press is fastened by two bolts passing through projecting pieces, d, d, of the iron frame. At e a piece of iron is fastened, projecting from the iron frame, and supporting a socket for the square iron slider f to slide up and down through, and to avoid any shake in its motion. The socket can be at any time made to fit the slider by the four screws (seen in both figures) which draw the two halves of the socket together. The upper end of the slider f is connected with the screw B, by a joint which allows the screw to turn round independently of theslider, but obliges the latter to accompany the screw in its vertical motion, either ascending or descending. At the lower end of the slider f, the punch or tool, g, is fastened by a clamp-screw: it acts in combination with another tool, k, called the die, fixed below it in the frame by four screws l, as shown in Fig. 3, which allow of its adjustment in the true position beneath the tool. The lower tool, or die, t, is fitted into a block, which is held by the four screws, and by this means the die can be quickly changed without disturbing the press. The upper tool can be removed in the same manner by releasing the clamp-screw which holds it in the slider f.

The, as the essential parts of the fly-press and its operation, are too simple to require much explanation. The workman, being seated before the press, holds the piece of metal to be acted upon in his left-hand, and draws the handle a towards him with the other: this, by turning the screws, forces the punch down upon the metal, and the momentum of the weight c causes it to act with such force, that the resistance of punching through a thick piece of metal is fearfully perceptible upon the handle. The principal part of this power is gained by the screw as well as by the accumulated inertial force of the fly. For many purposes where the resistance is but slight, the weight c is removed; the press acts simply by the lever and screw. It still remains, though improperly, the name of the fly-press. This alteration is intended to give the workman such a command of the machine, that he can more quickly reverse the motion than will be the case when the fly is in action. This can be only done where the resistance is very slight. Nails, the teeth of saws, open-work of fenders, and similar articles, are cut with appropriate tools in this manner. Figs. 4 and 5, represent some of the tools to be used in the press; a is a punch, and b the socket, or die, for perforating a circular hole, either with the view of forming a hole in a metallic plate for riveting, &c. or to prepare the piece struck out for boat-builders rivets, washers, or collets, buttons, ornamental flamps for fenders, and a vast variety of other purposes in which small circles of metal are useful. These pieces are forced through the die, and fall through a hole made in the frame A, into a small drawer placed beneath the bench for their reception.

C, D, are another pair of tools, in which the die D is embossed to the shape intended to be impressed on the ornamental flamps cut by the former punch. These are forced into it by the flat surface of the upper tool C. In some cases this tool at the same time punches a small hole by which the flamp is to be rivetted to the article it is intended to ornament, and the die must then be perforated with a small hole to convey away the fragment of metal forced out by the punch. In many cases these flamps are intended to be fastened on by a small pin projecting from their lower surface; in this case they are forged or cast in the manner of a nail, and the point or shank of a flamp being inserted into a hole. In the lower die the upper tool is forced down upon it, and impresses its figure upon its head; it is plain that here the upper tool must be embossed instead of the lower. A concave or convex figure is given to the small circles before-mentioned, by making the end of the punch a Fig. 4, concave or convex, and the pressure it exerts to force out a piece of plate is sufficient to impose upon the fragment the figure of the punch. In Fig. 5, E, F are another small pair of dies for punching small circular holes, and G H is a similar pair of tools for square holes.

The manner of punching out the concave shells for small buttons, which are termed shell buttons, is deferring of notice. First, small circles, (one of which is seen in the section at r, Fig. 6.) are cut out from plate-brafs, by a plain round punch and die, similar to a b, Fig. 4; the dies, (Fig. 6,) are now used. The circle of brafs, being placed over the hole of the die L, is forced through it by the end of the other tool, k, which being smooth and of a spherical figure, presses the plate of metal to assume the same form, and fall into the drawer beneath the plate of s, when it is fit for use. It must be observed, that the aperture through the die, L, is as much larger than the tool K, as to admit the thickest of the metal all round it, and the upper side of the whole must not be left sharp, but rounded off, so as not to cut, but only bend the piece of metal in passing through it: also the circle of metal must be larger than the hole, that there may be a sufficiency to form the cup or hemisphere s. The size of this circle is shewn by the dotted circle r, in the plan Fig. 6, which likewise shews a piece of brafs t, in the form of a square; it is fastened upon the die, to guide and flap the circle in the point where it is concentric with the hole over which it is placed.

The open-work in fenders, and ornamental fire-grates, is clamped out by the fly-press. For this purpose the pattern
intended to be cut out is described upon the plate of calf-leather intended to form the fender, and by appropriate punches the holes are freefively cut out. In this manner the diamonds, lozenges, triangles, and other figures, we observe in these articles are removed with great facility. This operation has lately received great improvement from Mr. Proctor of Sheffield. By this new method a great number of punches, and of different figures, are moved at the same time, and the necessity of describing the pattern upon the plate is obviated; whereas in the common method the fenders must pass through the press as many times as there are figures in the pattern, and it requires some skill and judgment in placing the fender so correctly in its true position beneath the tool of the press, so to have no inaccuracies in the pattern discernible to the eye.

Fig. 7, is the press used for the purpose, though not exclusively, all heavy articles being hinged in a press of this kind. The improved apparatus is seen on the ground by the side of the press, where A A is the plate of the press, inclosed between two leaves of a frame B, similar to book-ends. The leaves are two plates of steel hardened and tempered; the figure of D (fig. 8), cut out in exactly the same pattern as the fender is intended to be. These plates are attached, by four screws in each, to an iron frame C, connected by hinges E; when shut together, as at A A, the apertures in the upper and lower leaves correspond, and the plate A is interposed between them. A number of fiddle punches of the proper figure, as T, are placed in the holes of the upper leaf, so as to fill them all up, and the whole is placed upon the lower bed H of the press, and the iron bed D being forced down upon the punches by the screw, drives them all through at once, and removes corresponding pieces from the steel plate A A. The punches fall through the plate, and are received in a small drawer, beneath the bed of the press. The screw being turned back, the tools and plate are removed to the table K before the press, the book opened, and the plate is put forwards through the leaves, so as to cut out another length. To ensure the parallelism and proper distance from the former pattern, the leaves have one more hole in them than is intended to be cut out at the operation. In fig. 8, A represents this hole, which is brought to coincide with the hole cut by A at the former operation. By this means, it is certain to be in a straight line, and to keep it so. A punch is put through the plate in this hole A before it is placed under the press a second time. The workman is seated upon the beam L, before the table K, and finds the punches, which had fallen through into the drawer, standing up in it in the true position; and he has only to transfer them to the leaves for the next stamp. At N is seen another pair of leaves; and at fig. 9, a piece of the plate cut between them: n are two of the punches; the leaves are represented as opened to admit the plate, and its position is adjusted by placing two of the punches through the holes stamped in the plate by the former stroke.

The press (fig. 7) is of large dimensions; its frame P is double to give greater strength; the lever R loaded at each end with heavy weights. It is in many feet in length, though it is seen away, and consequently foreheads serve the purpose. The frame S S L is placed beneath the surface of the ground, and a circular walk is made for the two men who run round with the end of the lever R, to give it as great a velocity as possible, that its momentum may give a great energy to the action of the screw. The workman seated upon L, is low enough to be beneath the lever as it moves over his head. The screw is pointed at the lower end, and acts in a socket on the top of the slider M; to the lever end of which the moving bed I of the press, is fastened: to balance the weight of the slider and bed, a lever X, and a heavy weight Y, are applied, which raises them up when the screw is turned back, so as to admit the work being placed beneath the press.

Fly, in Rural Economy, a disease incident to sheep, in consequence of their being flirked by a fly, which produces a sort of maggot that eats into, and remains in the flesh. The sheep that are in a poor weakly state, and in the wool of which there is a deficiency of what is denominated the yolk, are the most exposed to such attacks; as the most suitable nidus is, in such cases, afforded for the fly to deposit its grna in. After the eggs are thus deposited, they are quickly hatched by the warmth of the animal, directly eating into, and feeding upon it when not guarded against. Its attacks are the most frequent in hot funny seasons. In order to the removal of the maggots, some have recourse to the cutting or clipping away the wool about the parts affected, and afterwards to the application of tar, or a mixture of train oil and sulphur upon them. When, however, the maggots are not completely formed, the parts are only slightly dabbed with white lead in the state of fine powder. Where precautions of these kinds are neglected, the sheep are speedily destroyed by the disease. In situations where the insects are small and much surrounded with woods, it is essentially necessary to keep a constant attention to sheep, to see that they are not struck by the fly, as a few hours may often prove of the utmost consequence in the removal of the disease, and the safety of the animals.

It has been suggested that the shepherds in the midland districts of the kingdom employ a variety of applications as preventative of the fly, especially with lambs. They had train oil efficacious, but it fouls the wool, and makes the sheep unpleasant to touch. An ointment, composed of butter, and the flower of sulphur, is in the highest esteem. In preparing it, the butter is first melted over a slow fire, and then a proper quantity of sulphur is, to it, until it becomes of a pretty thick consistence, and rather firm. In applying it, a piece about the size of a small walnut is rubbed between the hands, which are then drawn along the back; or other parts of the sheep. As insects have, amidst their antipathies, it is useful and interesting to read out those of the sheep-fly. The manner of destroying the maggots just noticed is both effectual, and when referred to its time, simple and easy. In the part of the country most noted above, instead of clipping the wool from the part which is affected, and forcing out the maggots with the points of the shears, the wool is parted by theingers, and the maggots removed by the point of a knife, or dissolved in some other manner, without breaking the coat; and thus a small quantity of white lead, finely scraped from a lump, is mixed in the wool, which, by being agitated with it, is carried down in an even manner upon the part which had been affected. It is frround that a large quantity discolours the wool, while a little preserves any further harm from the maggots that may have been left among it, driving them away from the wound; a at the same time promotes its healing. It is stated that in well sheathedflocks, that are fed regularly twice in the course of the day, there is no such thing as a broken coat. But though the practice is not in full laid down may be extremely proper in many cases, it does not always prove successful. The oxides of carbon or mercury are found far more effectual in some cases of this troublesome disease.

Fly, a disease in turnips, which is supposed to be produced by a fly that eats the leaves. It has been observed by the author of the "Philosophy of Agriculture..."
and Gardening," that if this destructive insect be of the *scaecabina* or beetle kind, which arises out of the earth, it may be destroyed by rolling. He remarks, that the Chinese are said by Sir George Staunton to steep all their seed in liquid manure until they swell, and their germination begins to appear, which they believe not only hastens the growth of the plants, but also defends them against insects beneath the soil; and that to this, Sir George observes, it may be owing that the Chinese turpins escape the fly, so injurious to them in the country. An observation of Mr. Combe, in the Bath Agricultural Papers, seems, he says, also to confirm this idea. He affirms, that when turnip seed is sown during rain, or has rain immediately afterwards, the first leaves are so vigorous that the fly never attacks them; or that the rain itself is so inconvenient to the fly as to prevent its appearance. It is likewise supposed by the Rev. Mr. Stacy, in his "Observations on the Failure of Turnip Crops," that the dryness of the soil at the time the seed is put into the ground, and the great heat of the season, by not deftaining the seed to vegetate quickly, is a principal cause of the destruction that so frequently takes place in crops of this kind. It is also affected by Mr. Ester, in the Transactions of the London Society of Arts, that the flying turpins in drills deeper than by broadcast, accelerates the growth of the plant, by giving it more moisture; whereas it sooner puts forth its leaves, and escapes the depredations of the fly. He speaks highly of the use of the drill, advises the rows to be one foot distant, useth three quarters of a pound of seed to an acre, and soweth them from one inch and a half to two inches deep. As it is probable that injury may be done by fowing too deep, as well as by the contrary, in either case it will be the most proper practice to constantly choose as most a season as possible for fowing the summer crops of this sort of plants. And whenever the season is very dry, to have recourse to the sowing of the feed for a few hours, but not more than that, before it is put into the ground. It is likewise supposed by some, that by fowing radish, mustard, or some other sort of feed that this insect may prefer when in the state of young plants, at the same time with the turnip seed, the disease may be much lessened, if not wholly prevented.

But another, and probably a better mode of guarding against and preventing the disease, is that of having the land well enriched with manure before the crop is put in, as by that means the young plants are rapidly pushed forward into broad leaf, when they become secure from the ravages of the fly. The footting the rows of the young turpins just as they appear, by sprinkling the foot along them in a sort of fine rain, from a feed lip, has also been advised as a successful practice, which was long ago known to Ellis. Several other methods have been recommended at different times, but no certain mode of removing or preventing the effects of this insect on young turpin plants has hitherto been discovered. See TURPIN.

Fly, in the Sea Language, that part of the mariner's compass on which the thirty-two winds are drawn, and to which the needle is fastened underneath. See COMPASS.

Fly of an Oven, is the breadth or extent from the flaff to the extremity or edge that shutters before in the wind.

Let Fly the Sleet, at Sea, a word of command, in case of a gale of wind, left the ship should overfly, or spend her top-masts and masts, to have the sheet go-amain, and then the fall will hold no wind.

Fly the Heels, in the Manage. A horse is said to fly the heels when he obeys the spurrs. See HEELS and SPURRS.

To Fly gross, in Falconry, is said of a hawk, when the flies at the great birds; as cranes, geese, herons, &c.

Fly on Head, is when the hawk, missing her quarry, betakes herself to the next check, as crows, &c. See HAWK.

Fly-boat, or Flight, a flat-bottomed Dutch vessel, whose burthen is generally from four to six hundred tons. It is distinguished by a remarkably high stern, resembling a Gothic turret, and by very broad buttocks below.

Fly-tool, is a very light narrow wooden spade fixed with iron, which the navigators of a canal use for cutting or throwing out any lost clay, peat, or the like, and which they do so quickly and dexterously as to keep two successive pieces flying in the air together.

Fly-catcher, in Ornithology. See MUSCICAPA.

Fly-catcher of Edwards, grey and yellow. See Todus cinereus.

Fly-catcher of Latham, paradise. See Todus paradisaeus.

Fly-catcher, grey-blue, and blue-headed grey, varieties of the *Catharacta Syræa*.

Fly-catcher, yellow-throat. See *Motacilla flavigularia*.

Fly-bane, in Botany. See *Staphylea*.

Fly-honfuckle. See *Lonicera*.

Fly-horn holidays, African. See HALLERIA.

Fly-tree, in Natural History, a name given by the common people in America to a tree, whose leaves, they say, at a certain time of the year, produce ties. On examining these leaves about the middle of summer, the time at which the flies used to be produced, there are found on them all sorts of bags of a tough matter, of about the size of a half-pear, and of a dusky greenish colour; on opening one of these bags with a knife, there is usually found a single full-grown fly of the sound kind, and a number of small worms, which, in a day or two more have wings, and fly away in the form of their parent. The tree is of the mulberry kind, and its leaves are usually very largely flocced with these infect bags, and the generality of them are found to contain the infects in the worm flate; when they become vioned, they soon make their way out. The bags begin to appear when the leaves are young, and afterwards grow with them; but they never rupture the leaf, or injure its shape. They are of the kind of leaf-galls, and partake in all respects, except size, of a species we have frequent on the large maple, or, as it is called, the fycamore. Philos. Trans. N. 431. See further, Reaumur's Hist. vol. vi. p. 34. See PUCERON.

Fly-court. See SILENE.

Fly-island, in Geography, an island in the South Pacific ocean, discovered by Le Maine and Schouten in the year 1616, so called from the number of flies found there. It is covered with trees, but within overflowed at high water. Some inhabitants were seen naked. S. lat. 15°. W. long. 150°.

FLYERS, in Architecture, are the series of steps, which taken altogether constitute a flight, and any single step is called a flyer, the treads of which are of equal breadth throughout, and thus flyers differ from windsers; the treads of the latter diminish continually from the wall of the stair-case to the well-hole.

FLYING, the progressive motion of a bird, or other winged animal, in the liquid air.

Flying is either natural or artificial.

FLYING Army. See Army.

FLYING Bridge. See Bridge.

FLYING Comp. See Camp.

FLYING, natural, is not performed by an apparatus, or structure
FLYING.

Armature of parts, concerted for that end by nature herself. Such is that of most birds and insects, and of some fishes.

The parts of birds, &c., chiefly concerned in flying, are the wings and tail; by the first, the bird sustains and wafts itself along; and by the second, it is enabled to ascend and descend, to keep his body poised and upright, and to obviate the vicissitudes thereof.

It is by the largeness and strength of the pectoral muscles, that birds are so well disposed for quick, strong, and continued flying. These muscles, which, in men, are scarcely a twentieth part of the muscles of the body, in birds exceed and outweigh all the other muscles taken together; upon which Mr. Willughby makes this reflection, that if it be possible for man to fly, his wings must be contrived and adapted, that he may make use of his legs, and not his arms, in managing them.

The flying of birds is thus effected:

The bird first bends his legs, and springs with a violent leap from the ground; then opens, or expands the jointures of his wings, so as to make a right line, perpendicular to the sides of his body: thus, as the wings with the feathers therein, constitute one continued ham, being now raised a little, and vibrating the wings, with great force and velocity, perpendicularly against the air; the air, though a fluid, refits those effusions, both from its natural inactivity, and from its elasticity, which makes it restore itself after it has been compressed, and react as much as it has been acted on; by such means is the whole body of the bird protruded. The sagacity of nature is very remarkable in the opening and recovering of the wing for fresh strokes. To do it directly, and perpendicularly, it must needs have a great resistance to overcome; to avoid which, the body part, or head of the wing, into which the feathers are inserted, moves sideways with its sharp end foremost, the feathers following it like a flag.

The resistance the air makes to the withdrawing of the wings, and consequently, the progress of the bird will be so much the greater, as the weight, or force, of the fan of the wing is the longer: but as the force of the wing is continually diminished by this resistance, when the two forces are come to be in equilibrium, the bird will remain suspended in the same place; for the bird only ascends so long as the arch of air the wing describes makes a resistance equal to the excess of the specific gravity of the bird above the air; if the air, therefore, be so rare as to give way, with the same velocity as it is struck withal, there will be no resistance, and, consequently, the bird can never mount.

Mr. Ray, Willughby, &c., have supposed the tail to do the office of a rudder, in steering and turning the body this way or that; but Borelli has shown it to be unfit for any such office. The flying of a bird, in effect, is quite a different motion from the failing of a ship; birds do not vibrate their wings towards the tail as oars are struck towards the stern, but waft them downwards; nor does the tail of the bird cut the air at right angles, as the rudder does the water, but is disposed horizontally, and preserves the same situation what way soever the bird turns.

In effect, as a vessel in the water is turned about on its centre of gravity to the right, by a brisk application of the oars to the left, so a bird, in beating the air with its right wing alone, towards its tail, its force will be turned to the left; as when in swimming, by only striking out with the right arm and leg, we are driven to the left.

Add, that birds with long necks have another way of altering their course; for, by only inclining the head and neck towards this or that side, the centre of gravity of the whole being changed, the bird will proceed according to this new direction.

Birds never fly upwards in a perpendicular line, but always in a parabola, the line described by projectiles. In a direct effect, the natural and artificial tendency would oppose and destroy each other; so that the progress would be very slow. In a direct effect, they would aid one another, so that the fall would be too precipitate. Indeed the hawk will frequently find that advantage in keeping of the parabola; but ordinarily birds keep their wings expanded, and at rest, to retain their descent; and at the same time stretch out their legs.

FLYING. Artificial, is that attempted by men, by the assistance of mechanisms.

The art of flying is one of the great difficulties of mechanics; it has been attempted in divers ages; the discovery of it might prove of great service, and also of great difference to mankind.

Nobody seems to have bid so fair for that invention as our famous frater Bacon, who lived near five hundred years ago. He not only affirms the art feasible, but affirms us he himself knew how to make an engine, in which a man fitting might be able to carry himself through the air like a bird; and affirms, that there was another person who had actually tried it with success. See the article Bacon.

The secret consisted in a couple of large thin hollow copper globes, exhausted of air, which being much lighter than air, would sustain a chair, whereon a person might sit.

F. Francisco Lana, in his Prodomo, professes the same thing, as his own thought. He computes, that a round vessel of plate-brass, fourteen feet diameter, weighing three ounces the square foot, will only weigh 1543 ounces; whereas a quantity of air of the same bulk will weigh 553 ounces; so that the globe will not only be sustained in the air, but will carry with it a weight of 753 ounces; and by increasing the bulk of the globe, without increasing the thickness of the metal, he adds, a vessel might be made to carry a much greater weight.

But the falacy is obvious: a globe of the diameter he describes, Dr. Hook shews, would not hold the pressure of the air, but would be crushed towards, therefore, in whatever ratio the bulk of the globe were increased, in the same bulk the thickness of the metal be also, and consequently the weight increased: so that there would be no advantage in such augmentation.

The same author describes an engine for flying, invented by the Sénor Delincé, a man of Sable, in the county of Maine. Vide Philosph. Collect. N. 1.

The famous bishop Wilkins was so confident of successes in this art, that he seems to intimate that, in future ages, it will be as usual to hear a man call for his wings when he is going a journey, as it is now to call for his boots. See Math. Maga. b. ii. ch. 7. Discovery of a new World, prob. xiv. p. 135. Secret and Swift Messengers, ch. iv. See Alde station.

FLYING. Bretzls, in Pointed Architectede. This is one of the boldest and most striking features of the style of building in question: being a prop of masonry work, and in the air to support some elevated part of a building, when cannot be propped immediately from the ground. Flying buttresses are generally seen on the outside of ancient cathedrals, and other large magnificent churches, flying over the side aisles from the main external buttresses to the upper walls of the nave, to prevent them from spreading.
The geometrical principle on which they support the walls and the buttresses, by means of the slanting line of their upper part, and are supported by them, by means of the arches beneath, is one proof, amongst many others, of the ingenuity and scientific skill of the architects of the middle ages.

**Flying of Colours**, is used by painters to denote their want of durable paint, which they express by their *floundering*.

**Flying-fish**, in *Ichthyology*, a name given by the English writers to several species of fish, which by means of their long fins have a method of keeping itself out of water for some time. The flying-fish, most properly so called, is the exocetus of the ancient authors, and of Artech. (See *Exocetus*.) See a minute and accurate description of the *exocetus volitans*, or flying-fish, in the Phil. Trans. vol. xvi. part b. p. 791.

**Flying-fish** is also a name of a fish of the gurnard kind. See *Callyonimus Lyra*.

**Flying Pi-ha**, is a part of a clock, having a fly or fan, whereby to gather air, and so bridge the rapidity of the clock's motion, when the weights depends in the striking part. See *Clock*.

**FO**, or *Foi*, in *Mythology*, the object of religious veneration and worship in China, and also, under various other appellations, in different parts of India. *Fo* is supposed by Dr William Jones to be the Buddha of the Hindoos (see *Buddha*); and it has been generally supposed that the worship of this deity was introduced into China, together with a few of his votaries and fragments of the canonical books of the Indians, about the 6th year of the Christian era; though some have referred this event to a later period as the year 630. See under the article *China*, the account of the *Religion of the Chinese*. The native place of this pretended god is unknown; nor can his origin and the etymology of his name be satisfactorily ascertained. Some suppose that he lived about 600 years before Christ; and that he first appeared in the southern part of India, among the nations situated on the shores of the Indian ocean, and thence disseminated his philosophy, by means of his disciples, to all India. It is related by his followers, that at the age of 19 he retired to a desert accompanied by some philosophers, to whose tuition he committed himself. At the age of 30, it is said, he felt himself suddenly inspired, and that he attained to the intuitive knowledge of the first principles of all things, from which time he took the name of Fô, which signifies "something more than human." His mystical philosophy he is said to have delivered to innumerable disciples, under the veil of allegory; and the Japanese add, that in his contemplations, during which his body remained unmoved, and his senses unaffected by any external object, he received divine revelations, which he communicated to his disciples. As soon as he became a god, he thought of establishing his doctrine, and of proving his celestial mission by performing miracles. The number of his disciples was immense, and they soon spread his opinions through every part of India, and the higher extremities of Asia. His priests are generally known by Europeans under the appellation of *Bonzes*. For an account of their character and office, we refer to that article.

Buddha, Xekias, or Fôe, for by these and other names he is called, is said to have had both an exoteric and esoteric doctrine; in the former he taught the difference between good and evil; the immortality of the souls of men and brutes; different degrees of reward or punishment in a future world; and the final advancement of the wicked, after various transmigrations, to the habitations of the blest. This doctrine of the transmigration of souls has given rise to that multitude of idols, which are revereved in every place, where the worship of *Fo* is established. Quadrupeds, birds, reptiles, and the vilest animals had temples, and became objects of public veneration, because the soul of the god in his transmigrations and metamorphoses might have inhabited their bodies. His followers also say, that the god *Fo* came upon earth to save mankind; that by him their sins are expiated; and that he alone can procure for them happiness in the life to come. To the reverence of living creatures; the *Fô* forbids the killing of any living creature; the *foochal*, the taking away of the goods of another; the third forbids men to pollute themselves by uncleanness; the fourth, to lie; and the fifth, to drink wine. They, above all, recommend the practice of certain acts of mercy; such as, to treat their bonzes well, to build monasteries and temples for them, and to supply them with every thing necessary, in order that they may be able, by the affability of their prayers, and the pittance which they impose, to merit forgiveness, and the remission of all their sins. The Bonzes pretend, that when *Fo* had attained to the age of 79, he perceived that his borrowed divinity could not prevent his paying the debt of nature like other men; and, therefore, he would not leave his disciples without revealing to them the whole secret and hidden mysteries of his doctrine. Having called them together he declared that till that moment he had always thought proper to speak to them in parables, and that for 40 years he had divulged the truth under figurative and metaphorical expressions; but being about finally to leave them, he would unveil the whole mystery of his wisdom. "Learn then," said he, "that there is no other principle of all things, but a vacuum and nothing; from nothing all things have sprung; to nothing they must again return, and then all our hopes end." This is the aim of his exoteric or internal doctrine. To one of his favourite disciples he committed his most secret thoughts, and him he entrusted with the charge of propagating his doctrine. He directed him never to attempt to support his tenets by proofs and long reasoning, and commanded him to put only at the beginning of the books which he published: "Thus have I learned." In one of his works the same Fo mentioned another matter more ancient than himself, whom the Chinese name "O-mi-to," and the Japanese "Amida." The bonzes assure us, that the latter became so eminently holy, that it is at present sufficient only to invoke him, in order to obtain immediate pardon for the greatest crimes. The Chinese, therefore, on almost every occasion, have continually in their mouth these two names, "O-mi-to, Fo!"

**FO-III.,** one of the first and most celebrated legislators of China, and said to be the founder of the Chinese monarchy. (See *China*.) Little is known of the methods by which this legislator adapted for civilizing the country; and the prec-ict era of his establishment is so ancient, that it cannot be ascertained. An ancient book, called "Yekim," which is still preferred in China, is ascribed to *Fo-hi*; but it is written in hieroglyphics; and no one has been able to give a satisfactory explanation of its contents. The most probable conjecture is that of Leibnitz, that it was intended to teach the art of numeration. *Fo-hi* was succeeded by several emperors, who carried forward the work of civilization, particularly by means of moral allegories, fables, and poems.

**FOA**, in *Geography*, one of the Hapae islands, in the S. Pacific ocean, between Haano and Leleoga, to both which
FOAL, in Rural Economy, is the common name of the young of the horse kind. The male is termed a colt foal, and the female a filly foal. Foals, when they are of the valuable kind, should always be kept as well as possible while they are growing, as without attention in this respect they seldom make good horses. See HORS.

It is contended by some experienced horse breeders, that it is not by any means difficult to ascertain in the foal, what the form of it will be when grown to the full size, as it will carry the same shape at six years old that it carried during the first month, if it be not improperly managed in the keeping afterwards. And it will have the good or defective form accordingly. In judging of the height, the thin-bone should be particularly regarded; where that is large, and long from the knee to the pattern, it indicates a tall or full bred horse. And another method of judging is that of examining the space between the knee and withers, which being doubled will mostly give the height of the animal when grown. The means of ascertaining their probable goodness at this early period is more difficult, but it is commonly supposed that where they are active, stirring, not easily frightened, and anxiously striving for mastery, they will prove well metalled horses in their full grown state.

FOAL-foot, a common name applied sometimes to the troublesome weed termed colt's foot. See COLT'S-foot.

FOAL-teeth, the set which are put forth during the first year of the animal's age. See Age of the Horse, and HORS.

FOALING, a term signifying the act of parturition or bringing forth in the mare. Great attention should be paid to the animals about this period, as it not infrequently happens, that mares destroy their foals by becoming entangled in the thistles or other places, by means of their halters, &c. or by the difficulty of bringing them forth. It is the best way to look to them frequently at such times.

FOCA, in Geography, an island in the Atlantic, near the coast of Guinea, and the mouth of the Calabar, with a town of the same name, called by the Dutch Wondorp.

FOCAGE, or FUGGE, fire-money, heart-money, or chimney-money. See FUGGE.

FOCAI, in Geography, a town of Egypt; 20 miles N. of Abu-Girâé.

FOCAKO, a mountain of Naples, in Otranto; 20 miles N.E. of Tarento.

FOCAS, a town of Japan, in the island of Nippon; 145 miles N.W. of Jeda.

FOCHABERS, a market town of Scotland, in Badshire, conglom of one street, on the right hand of the Spey; 12 miles W. of Cullen and 9 L. of Elgin. Near it stands Gordon castle, a magnificent seat, in a very extensive park, founded by George, second Earl of Huntley; originally called the castle of the Dog of Cull. A little below the common ferry across the river is the ford, through which the duke of Cumberland marched his army in 1746, in the face of the rebels, who were advantageously posted on a rising ground. Thence to Elgin, the foal, for soil part, is light, montrous, and barren. At the mouth of the Spey is Carmouth harbour, where great quantities of salmon, preferred in ice, are shipped for London. From this port timber of a good quality is exported. N. lat. 57° 26'. W. long. 3° 3'.

FOCHAN, a famous village of China, lies 4 leagues from Canton, said to be the largest and most populous in the world; it is called a village, because it is not included by walls, and has not a particular governor, although it carries on a great trade, and contains more houses and inhabitants than even Canton itself. It is reckoned to be three leagues in circumference; and to contain a million of inhabitants.

FOCHEA, Fогога, or Pogogia, a sea-port of Asiatic Turkey, in Natolia, situated at the mouth of the Hermus, in the gulf of Smyrna, anciently called Phocaea; 28 miles N.W. of Smyrna. N. lat. 38° 44'. E. long. 26° 39'.

FOCHIA, a town of Bosnia; 73 miles S.S.W. of Belgrade.

FOESANI, a town of European Turkey, in Moldau, on the Milcov; 54 miles W.N.W. of Galacie. N. lat. 44° 42'. E. long. 27° 14'.

FOCUS, in Geometry, and the Conic Sections, is applied to certain points in the parabola, ellipse, and hyperbola; wherein the rays reflected from all parts of these curves do concur or meet.

The foci of an ellipse are two points in the axis, on which as centres, the figure is described; or two points in the longer axis, wherein the rays reflected from any point in the circumference, shall be together equal to the axis itself. There are also called umbilics. See Conic Sections and Ellipse.

Focus of the Hyperbola. See Conic Sections and Hyperbola.

Focus of a Parabola, is a point in its axis, wherein the semi-ordinate is equal to the semi-parameter; or, a point in the axis distant from the vertex, by a fourth part of the parameter, or latus rectum. See Conic Sections and Parabola.

Focus, in Optics, is a point wherein several rays concur, and are collected; either after having undergone refraction, or reflection.

It is thus called, because the rays being here brought together, and united, their force and effect are increased; so that they become able to burn; accordingly, it is in this point that bodies are placed to inflame the fire of burning-glasses, or mirrors.

It must be observed, that the focus is not, strictly speaking, a point: the rays are not all accurately collected into the same place: Huygens demonstrates, that the focus of a lens, convex on both sides, is 4ths of the thickness of the lens.

Focus, in Dipsis, is the point wherein refracted rays, rendered convergent by refraction, do concur or meet, and cross the axis.

The same point is also called the point of convergence, or concurrency.

Focus, Virtual, is the point from which refracted rays, when by refraction they are rendered divergent, or bent to diverge or spread from each other.

The same point is also called the point of concurrence, or point of divergence, in opposition to the real, which is called the point of contact. Suppose, 4 gr. the capacity of a gazelle to be a dot. Draw N. V. through a, and its axis a b; and draw a ray of light parallel to the axis d e, and let f be the centre of the arc d e. This ray, after it has passed the glass, at its contact at a, will not proceed directly to b, but will be refracted from the apex, parallel to d e, and become the ray d g. Draw then directly f g, so that it may cross the axis in w. The point e so found, is called by Mr. Molyneux the virtual focus, or point of divergence.

The effect of convex glasses, or lenses, is to render the rays transmitted through them, convergent, and to bring them together into a focus, which will be nearer or farther...
farther off, as the lens is a portion of a greater or less sphere.

The effect of concave lenses is to render the rays transmitted through them divergent, or to disperse them from a virtual focus.

For the place, position, distance, &c. of the foci of rays refracted through plain, concave, and convex mediums of divers densities, as air, water, glass, &c., see Refraction, Lenses, &c.

The laws of the foci of glasses, and the methods of finding the same, being those of modern and importance; we shall here subjoin a part, as directed and demonstrated by Mr. Malusius, in his "Dioptrica Nova."

1. The focus of a convex glass, i.e., the point wherein parallel rays transmitted through a convex glass, whose surface is the segment of a sphere, do unite, is distant from the pole, or vertex of the glass, almost a diameter and half of the convexity.

2. In a plano-convex glass the focus of parallel rays, or the place where they unite with the axis, is distant from the pole of the glass a diameter of the convexity, provided the segment do not exceed thirty degrees.

The rule or canon in plano-convex glasses is as 107: 193: so is the radius of the convexity : to the refracted ray taken to its concourse with the axis; which in glasses of larger spheres is almost equal to the distance of the focus taken in the axis.

3. In double convex glasses of the same sphere, the focus is distant from the pole of the glass about the radius of the convexity, if the segment be but thirty degrees.

But if the convexities be unequal, or if the two sides be segments of different spheres, then the rule is,

As the sum of the radii of both convexities : to the radius of either convexity alone :: fo is the double radius of the other convexity : to the distance of the focus.

Here observe that the rays which fall nearer the axis of any glass are not united with it so near the pole of the glass as those farther off; nor will the focal distance be so great in a plano-convex glass when the convex side is towards the object, as when the plain side is towards it.

Hence it is truly concluded, that, in viewing any object by a plano-convex glass, the convex side should always be turned outward; as also in burning by such a glass.

Focus, for the virtual, observe. That in concave glasses, when a ray falls from air parallel to the axis, the virtual focus, by its first refraction, becomes at the distance of a diameter and a half of the convexity.

2. In plano-convex glasses, when the rays fall parallel to the axis, the virtual focus is distant from the glass the diameter of the convexity.

3. In plano-convex glasses, as 107: 193:: so is the radius of the convexity : to the distance of the virtual focus.

4. In double concave glasses of the same sphere, the virtual focus of parallel rays is at the distance of the radius of the convexity.

But, whether the convexities be equal or unequal, the virtual focus, or point of divergency of the parallel rays, is determined by this rule:

As the sum of the radii of both concavities : is to the radius of either concavity :: fo is the double radius of the other concavity : to the distance of the virtual focus.

5. In concave glasses, exposed to converging rays, if the point to which the incident ray converges be distant from the glass farther than the virtual focus of parallel rays, the rule for finding the virtual focus of this ray is this:

As the difference between the distance of this point from the glass, and the distance of the virtual focus from the glass :: so is to the distance of the virtual focus :: fo is the distance of this point of convergence from the glass:

to the distance of the virtual focus of this converging ray.

6. In concave glasses, if the point to which the incident ray converges be nearer to the glass than the virtual focus of parallel rays, the rule to find where it crosses the axis is this:

As the excess of the virtual focus, more than this point of convergence :: is to the virtual focus :: so is the distance of this point of convergence from the glass:

to the distance of the point where this ray crosses the axis.

Rules for finding the focus of glasses.—To find the focus of a convex spherical glass, being of a small sphere, apply it to the end of a scale of inches, and decimal parts, and expose it before the sun; upon the scale you will have the bright interstiction of the rays measured out; or, expose it in the hole of a dark chamber; and where a white paper receives the distinct representation of distinct objects, there is the focus of the glass.

For a glass of a pretty long focus, observe some distant object through it, and recede from the glass till the eye perceives all in confusion, or the object begins to appear inverted; here the eye is in the focus.

For a plano-convex glass: make it reflect the sun against a wall; you will on the wall perceive two spots of light; one more bright within another more obscure: withdraw the glass from the wall, till the bright image is in its least dimensions; the glass is then distant from the wall about a fourth part of its focal length.

For a double convex: expose each side to the sun in like manner; and observe both the distances of the glass from the wall. The first distance is about half the radius of the convexity turned from the sun; and the second, about half the radius of the other convexity.

Thus we have the radii of the two convexities; whence the focus is found by this rule:

As the sum of the radii of both convexities :: is to the radius of either convexity :: fo is the double radius of the other convexity :: to the distance of the focus.

Focus, in Cyclopaedia, is a point wherein the rays reflected from the surface of a mirror, or speculum, and by reflection rendered convergent, do concur, or meet.

The effect of concave mirrors is to collect the rays falling on the concave surface into a focus.

The effect of convex mirrors is to disperse the rays falling on them, or render them more divergent.

For the laws of the foci of rays reflected from mirrors, or specula, see Mirrors.

The foci of concave glasses are had by reflection: for, as a concave mirror has at the distance of about half the radius of the convexity; so a concave glass, being tipped up a reflecting speculum, unitas the rays of the sun at the distance of about half the radius of the convexity.

To find the focus of all glasses geometrically.—Dr. Halley furnishes us with a general method for finding the focus of spherical glasses of all kinds, both concave and convex: exposed to any kinds of rays, either parallel,
parallel, converging, or diverging; under the following problem.

To find the focus of any parcel of rays diverging from, or converging to, a given point in the axis of a spherical lens, and incident thereon under the same angle, the ratio of the lines of refraction being given:

Suppose \( C L \) (Plate V. Optics, fig. 2.) a lens; \( P \) a point in its surface; \( V \) its pole; \( C \) the centre of the sphere where \( C \) is a segment; \( O \) the object, or point in the axis, and from which the rays do proceed; and \( O P \) a given ray; and suppose the ratio of refraction to be as \( t \) to \( s \). Then making \( C R \) to \( C O \), as \( t \) to \( s \) for the immersion of a ray; or as \( r \) to \( s \) for the emission (i.e., as the lines of the angles in the medium which the ray enters, to the corresponding lines in the medium out of which it comes), and drawing \( C R \) from \( C \) towards \( O \), the point \( R \) will be the same for all the rays of the point \( O \). Lastly, drawing the radius \( D C \), if need be, continued; with the centre \( R \), and distance \( O P \), strike a piece of an arc, intersecting \( PC \) in \( Q \). The line \( QR \), being drawn, shall be parallel to the reflected ray; and \( P \), being made parallel thereto, shall intersect the axis in the point \( F \); the focus sought.

Or, make it, as \( CQ : CP : CR : CF \); then will \( CF \) be the distance of the focus from the centre of the sphere.

This author gives a demonstration of the method; and adds various figures, exhibiting the various cases of rays either diverging or converging as they enter, or emerge out of, the surface either of a convex or concave lens.

From this principle all the rules for the foci of rays parallel to the axis, as likewise for the principal focus where the rays near the axis do unite, are deduced. As,

Hence, 1. If \( OP \) be equal to \( CR \), the points \( O \) and \( C \) coincident, and the rays \( OP \), after refraction, run on parallel to the axis. 2. If the point \( Q \) fall on the same side of the axis, as is the point \( P \); then the beams after refraction do tend to, either diverging or converging, as before; but if \( Q \) fall on the other side of the axis, the diverging rays are made to converge by a convex, or the converging to diverge by a concave glass. 3. If \( OP \) do exceed \( CR \), the focus is in all cases on the same side of the glass, as is the centre of the sphere \( C \). But contrariwise if \( OP \) be less than \( CR \), the focus falls on the other side of the glass beyond the vertex \( V \). 4. An object may be so placed, that the rays next the axis of a convex glass shall have an imaginary focus transmitting diverging rays, when the more remote parts thereof shall make them converge to a real focus. 5. If \( OV \), the distance of the object from the pole or vertex of the glass, be taken instead of \( OP \), then will \( CQ \) be the difference of \( O V \) and \( CR \); and as that difference is to \( CR \), so is the radius \( CV \) to \( CR \), the distance of the principal focus from the centre of the sphere, whereof the glass is a segment. Or else as \( CP \) is to \( CR \): \( PO \) or \( RO \) is to \( PC \), the focal distance from the pole of the glass. Whence follows a general rule for the focus of all glasses; only according to Coroll. 1. if \( OV \) do exceed \( CR \), the focus is on the same side of the glass as the centre of the sphere, but if \( CR \) be greater, the focus is on the opposite side of the glass: whence it will be determined whether the focus be real or imaginary.

What has been said of one surface of the lens, is easily applicable to the other, taking \( F \) the focus for an object.

**FODDER, in Agriculture**, a term employed to signify all such substances as hay, carry, malt, &c. which are given to cattle with the view of feeding and keeping them. These substances, when blended together, are in some districts particularly called fodder. In the giving of fodder to all sorts of animals, care should be taken that the same be not given at one time: and that it be well cut into cakes or cribbs, which should be sufficient in quantity for the quantity of cattle. Where these points are not properly attended to, there must be great loss, not only by the fodder being littered about the yard, but from many of the more work cattle not getting the quantity of food that may be necessary for their support. In respect to racks, these of the fl axing and balest kinds are best for foddering, if made strong enough, that is, to as not to be overturned; for these racks may be lifted up as the dung rises in the yard, which those fixed in the ground cannot be.

It may be observed that open wintert make hay lay the deer, if a hard frost and snow happen to come at the beginning of them: for if once cattle come to fodder they will be held to it, or they will receive great damage. In wet or wolly weather, all the hay that can be given to cattle will not make them thrive so well as in such as is dry and frosty. Hence sheds are highly useful, in order to shelter them in such cases.

At the beginning of winter, as the latter end of October and great part of November, while cattle still continue out in the field at grass, it is very necessary to fodder them early in the morning, while the hoar-frost hangs on the grass, which they will not eat kindly off till the sun has warmed it, and dissolved the hoary matter that hangs upon it.

It is a practice in many places to tie cattle up to racks to fodder. This may be done with great advantage with cows, where the fodder is good as hay, or very good straw; but with young cattle, or such as have straw fodder only, it is unseasonable. And as cattle eat their fodder when fresh threshed much better than when it has been threshed two or three days, especially if the straw be but indifferent; it is proper that this should be attended to by the careful farmer.

As it is well known in general that little dependence can be placed on feeding cattle out of the foddering yard to grass before the middle of May, the farmer ought always to be well provided with winter-fodder, for his cows and young flocks, for this and the preceding months, as he will otherwise be in great difficulty, and run much risk in his flock.

In regard to the economy of cattle-buildings, it may be observed, that to have several divisions over and above what is continually used in the foddering yards or back sheds, or other out-houses, has great conveniences in it; one of which is, that in them the farmer can dispose of and separate his two-yearling cows, or other cattle, at the time of bulking, not only to keep down the bull, but from the other heifers, that would be keeping the bull, whereby they may hurt each other, &c. especially as cows forward with calf are apt to warp by keeping bulking cows. It may therefore, in many cases, prevent much injury to such sorts of live-stock.

**FODDER, in Agriculture**, a sort of fodder formed by cutting, mixing together, and compressing, by means of proper machinery, various sorts of coarse substances, such as the hulls of peas, beans, potatoes, and various other vegetables, as well as clover, hay, straw, &c., to as to make them come into a narrow compass. The utility and advantages of this sort of fodder have been shown by Mr. Lawton.
a sudden cold is induced by a change of wind; the air then is cold, next to it the land, and last the water, which is but slowly reduced in temperature, for the reason just mentioned. But the water being comparatively warm, will, from that circumstance, be diffused to give out a quantity of steam, which rising into the cold air, is immediately condensed into fog, and wafted along the earth's surface by the stream of air. Hence arise the fogs which mariners often find in approaching land in fair weather, and which are so common in London and other places where the tide penetrates inland. The writer of this article lived some years near a river of 30 or 40 yards in breadth; on certain evenings in summer, after sunset, a dense fog was found to accompany the course of the river; it was observed that this phenomenon never occurred but when the temperature of the water was at least 10 above that of the air, and that it almost always occurred when a difference of temperature to that amount took place; but it is likely that a less difference of temperature would have been sufficient if the river had been broader. Some philosophers, particularly Sauvage, maintain that fogs and clouds consist of water in a vesicular state; or that the molecules are surronded with films of water; this opinion seems to require further confirmation. The effect of fogs in apparently magnifying distant objects is notorious; it is an optical deception: the fog diminishes the brightness of objects, and consequently suggests a greater distance; but when the visual angle remains the same, the greater the distance the greater is the magnitude; hence objects at a moderate distance appear to be magnified. See Cloud, Evaporation, &c.

Fog, or Fogg, in Rural Economy, is a term that properly signifies the fine soft grais that immediately spring mass after the hay crop has been taken from the ground; but which is sometimes used for the long grass remaining in the pastures of the winter season. See After-Grass.

FOGARAS, in Geography, a town of Transylvania, on the Alanta, the see of a Greek bishop; 18 miles W. of Kronstadt. N. lat. 46°. E. long. 24° 34'.

FOGBARRY, a town of Bengal, on the borders of Botanic.

FOGELN, a small island on the W. side of the gulf of Bothnia. N. lat. 60° 38'. E. long. 17° 44'.

FOGAGE, a term applied to coarse or rank grasses not eaten down in the summer or autumnal season by any sort of live stock. The practice of fogging grases hinders for the winter support of stock has, it is said, been found highly useful in different situations. See Grass-Land.

FOGGI, in Geography, a town on the E. coast of the island of Bouro. N. lat. 3° 28'. E. long. 126° 24'.

FOGGIA, in Geography, a town in the P. of the island of Puglia. N. lat. 41° 25'. E. long. 15° 38'.

FOGIA. See Fochia.

FOGGING, a term made use of to signify a particular practice in the management of grass-lands, which has been chiefly confined to South Wales, and some districts in its vicinity. It is said by Mr. Young to consist in keeping the whole growth of the grass, in meadows of the upland kind, free from both the sedge and live flock during the summer and autumn, and eating it off in the winter. It is added that he many years ago knew a Suffolk clergyman who was in the regular habit of this singular practice, and who spoke of it as a most profitable one. He farther states that he has himself tried it three times, and found it useful with success. It is found that it thickens the herbage greatly, and yields far more valuable winter and spring food than any person would expect who never tried it. But it is suggested that it should only be practised on dry land, or such as is in a tolerably dry state.

The advantages of this system of grass husbandry have not however been shewn by any correct statements; and it must be evident that considerable lots must be fenced in such a full body of grass remaining upon the ground for such a long time of his.

FOGGY ISLAND, in Geography, an island so called by Beering in the N. Pacific ocean, near the west coast of America, about nine leagues in compass. N. lat. 56° 10'. E. long. 202° 45'.

FOGGY, Cape, the north-west extreme point of the above-mentioned island. N. lat. 36° 31'. E. long. 202° 46'.

FOGLIANESE, a river of Urbino, which runs into the Adriatic, at Pefaro.

FOGLIANO, a town of Naples, in Principato Ultra; 7 miles W. of Benevento.

FOGLIETTA,
FOGLIETTA, Uberto, in Biography, was descended from an ancient and noble family in Genoa. He was born in the year 1516, and was brought up for the profession of the law, which, however, he did not pursue, but spent much of his early life in travelling from place to place, and at Rome, where he resided some time, he made himself known by several elegant treatises and observations. From some passages in the latter, he is supposed to have been in priest's orders, though there are no other facts that go to prove the circumstance. In 1559 he published his work, entitled "Della Repubblica di Genova," for which he was prosecuted, his property confiscated, and himself banished. The cause of these hard proceedings was the freedom which he exercised on the condottieri and great men of the country. He had, however, the good fortune not to be wholly deserted; he found a liberal patron in cardinal Hippolito d'Este, who received him into his house upon terms of intimate friendship, and he was likewise held in considerable estimation by several other persons of rank. To divert his solitary hours in exile, he employed himself in writing a general history of his own times, beginning from the war of the emperor Charles V. against the protestants. He was the author of many other pieces of a like famous nature; but the last was the history of his own country, of which he lived to finish twelve books, from the foundation of Genoa to the year 1527. He died in the year 1581 at the age of sixty-three. The history of Genoa was published by his brother Paul, who was himself a man of learning, and a good Italian poet.

FOGOLOE, or Fugloe, in Geography, the most easterly of the Faroe islands, towards the north. N. lat. 62° 3'.

FOGO, a small island near the east coast of Newfoundland. N. lat. 53° 2'. W. long. 54° 7' 40'.
the stone, to prevent the tin and quicksilver contained in the
socket from being shaken out by any violence. The lustre of
stones set in this manner will continue longer than when
they are set in the common way.

When colouring foils are wanted, those of copper, above
described, may be either tinged with smoke, or stained, or
painted with some pigment or other colouring substan-
tice. The colours used for this purpose may be tempered with
oil, gummed or fixed water, or varnish; for red, in imita-
tion of ruby, carmine, with a little lake used in thinflas
fize, or shell-lac varnish, or bright lake in oil, should be em-
ployed: for the garnet-red, dragon's blood, dissolved in
feed-lac varnish, may be used; and for the vinegar garnet,
orange lake, tempered with shell-lac varnish. For the ame-
thyll, lake, a town a little Prussian blue, used with oil for
blue: where the effect of sapphire is wanted, Prussian blue
in oil, and spread on the foil more or less thinly, according
to the lightness or deepness of the colour required; for
the eagle marine, common verdigris with a little Prussian
blue, tempered in shell-lac varnish, should be used; for a
full yellow, yellow lacquer; and for the lighter colour of
topazes, the bors礙 and oil itself will serve, without any
addition. For a deep green, the cr. del of verdigris, tem-
pered in shell-lac varnish; but for the emerald, a little yel-
low lacquer should be added. See Doublets. Handmaid
to the Arts, vol. ii. p. 333; &c.

FOIL, or Foyle, among Looking glass Grinders, a sheet
tin, with quicksilver, or the like, laid on the back-side of a
looking-glass, to make it reflect. See Foiliing. The
word is formed of the Latin folium, leaf.

FOILING, among Hunters, the footing and tread-
ing of deer, which remains on the grass, but fearfully vi-

ble.

FOISSEN, in Rural Economy, is a term sometimes used
to signify the natural juice or moisture of grasses, or other
herbage.

FOIST, a term used to signify a muddy sort of smell
among hay, straw, grain, and other farm products.

FOISTY, having a muddy disagreeable smell.

FOIX, in Geography, a small province of France, before
the revolution, including Donouzain and the valley of
Andorre, bounded on the N. and E. by Languedoc, on the
S. by Rouflon and the Pyrenees, and on the W. by Gas-
conye; lying between 42° 25' and 43° 20' N. lat. and be-
tween 1° 15' and 2° 40' E. long.; sixty miles from N. to S.,
and towards the southern boundary thirty miles from W. to
E., but more northward its breadth is from 15 to 20 miles.
This province is traversed by the river Arriege. It was
anciently governed by its own counts, and united to the
province of France in the year 1667. It is divided into Up-
ner and Lower; the former, being mountainous and barren,
produces wood and pasture; the latter, more level and
tolerably fertile, yields grains, fruits, and wine, and both
abound in mines, mineral waters, and natural curiosi-
ties, a town of France, formerly the capital of the
above described province, and now the principal place of
a district, in the department of the Arriege, is an
ancient small town, at the foot of the Pyrenees, on the left
bank of the Arriege, with a castle or a rock commanded
by two adjacent hills; 15 leagues S.S.E. of Toulouse.
The place contains 3,600, and the canton 13,322 inhabit-
ants, on a territory of 292 square kilometres, in 24 communes.
N. lat. 42° 58'; E. long. 1° 40'.

FO-KIEN, a small but flourishing province of China,
bounded on the N. by the province of Tche-kiang, on the
W. by that of Kiang-ni, on the S. by Quang-tong, and on
the E. by the Chinesc sea. It has few plains, but industri-

FOL

fertilizes even the mountains, which are disposed in the
form of amphitheatres, and arranged in terraces one above
another. The valleys are watered by rivers and springs,
which descend from the mountains, and which the Chinesc
husbandman contrives to distribute so as to favour the cul-
ture and growth of his rice; he raises the water even to
the summits of the mountains, and conveys it in different
directions by means of bamboo pipes. The mountains are
covered with trees fit for naval architecture, and the pro-
vince furnishes wood in abundance, precious stones, quick-
silver, iron, and tin. Tools of steel of various kinds, thongs
of silk, and cloths of surprising thinness and beauty are made
in this province. It is also laid to contain gold and silver
mines; which the inhabitants are prohibited to open in
their own behalf: the pain of death. In the bays, and on the coasts guarded by
fortresses, great quantities of fish are taken, which, being
dried and salted, are carried into the interior provinces of
the empire. This part of China acquires great opulence
from the trade which its inhabitants carry on with Japan,
the Philippines, Java, Camboya, Siam, and the island of
Formosa, and they also import from other countries aloes,
cinnamon, pepper, fandal-wood, amber, coral, and other
similar commodities. Fo-kien contains nine fous, or cities of
the first class, and sixty-then, or cities of the third class.
Its capital is Fou-teh-on-fou. Each city has its own pecu-
liar dialect; but the language of the Mandarins is spoken
every where; few in this province understand it; never-
theless, it produces a great number of literati. The climate
is hot, but the air is pure and salubrious. The number of
inhabitants, according to the estimate of Sir George Staunton,
is fifteen millions.

FOLARD, Charles, Chevalier de, in Biography, was
born at Avignon in 1669. He received the rudiments of clas-
ical learning, and by reading Caesar's Commentaries,
became exceedingly dextrous in entering the military
service of his country. His designs were at first thwarted
by his father, till at length, finding opposition of no avail,
he allowed him to follow the bent of his inclination. He
served during the war of 1688, and was made aide-de-camp
to the duke de Vendome in 1702. In these campaigns he
not only distinguished himself as a soldier, but acquir-
ed an exact knowledge of the country in which the
battles were fought, and drew maps and plans of every
thing which he saw, and which was calculated to be service-
able to him in his future pursuits. At the battle of Caffano
he was thrice wounded; and afterwards, at the battle of
Malplaquet, he was wounded and taken prisoner. In 1714
he went to Malta, in order to afflit in defending that islan-
d against the Turks. After this he visited Sweden, and was
entrusted by Charles XII. with negotiating a plan, with
the court of France, for a projected invasion of Scotland
for the restoration of King James II. This scheme having
failed he returned to Sweden, and followed the emperor to
Frederiehshall, where that heroic prince was killed by a
cannon shot. (See charles XII.) Folard served his last
campaign in 1719 under the duke of Berwick, and from
this period he devoted himself to the study of military
tactics. In 1727 he published his great work, entitled
"Commentaries on Polibius," in six volumes 40. which
was, in fact, a depositary of his military reflections and in-
ventions, and though it was not distinguished for the neatness
of its style, and was moreover defective in method and order,
yet it was highly esteemed as containing much useful matter.
Folard wrote a piece, entitled "New discoveries respecting
War," and some other treatises on military subjects. In
1749 he was elected a fellow of the Royal Society of
London, and in 1752 he died at Avignon at the age of
eighty-
eighty-three. He was a man of great worth and integrity, and was entrusted during the last forty years of his life with the government of Bourbourg; he would probably have risen to much higher honours and more important duties in the state, had he not been a zealous defender of the miracles of the Abbe Paris, which gave offence to cardinal Fleury. A more elaborate account has been given of this distinguished soldier in a work entitled "Memoires pour servir à l'Histoire de M. le Chevalier de Polard." Moreni.

FOLD, in Rural Economy, a small inclosed space formed for confining any fort of live flock, &c. Folds are of several different kinds, according to the objects they have in view; and are essential in many cases where a number of animals are to be kept. See Farm-yard.

Fold Garth, the old term employed to signify a farm-yard or inclosed place in which cattle are confined. See Farm-yard.

Fold-net, among Sportmen, a sort of net with which small birds are taken in the night: there are two sizes of it; the least may be managed by one man, but the largest must be carried by two, and used thus: let the net be fixed on both sides to two strong poles about twelve feet long, each man holding one of them; let a third carry lights behind them, at the distance of two yards: the net should be carried between the wind and the birds, which roost on their perches with their breasts against the wind: another person who beats the bushes on the other side of the hedge, will drive out the birds towards the light.

Fold-fence, in Law. See FALDGE.

Fold-yard, in Rural Economy, the yard where cattle of different sorts are confined and fed during the winter season. Yards of this nature should be properly fitted up with convenient sheds and racks for the animals to eat their fodder from, and have suitable divisions for containing different denominations of cattle, or other live flock. See Farm-yard.

Fold, Sheep, the yard or inclosure in which sheep are confined during the nights in the winter months. Yards of this kind are not by any means so common as their great advantages and utility would seem to demand. They are capable of being made the means of raising great quantities of excellent manure, at the same time that they contribute greatly to the health and preservation of the sheep. These folds are of two kinds, as erections of the house or shed fort constructed for the purpose adjoining to the farm-yards, or such as are moveable and formed by art by means of hurdles in the field. In the former, which is still the common practice in Flanders, &c., the floors of the sheds or houses are occasionally covered with straw, sand, or other light dry earthy matters, by which a large quantity of valuable manure is obtained; which, when applied to cold wetish foils, is highly advantageous in producing abundant crops. It is observed, however, by the author of Modern Agriculture, that, since a spirit for inclosing, planting, and improvements in general has been introduced, the original breeds of sheep have been banished to the mountainous districts in the northern parts of the island, where cultivation has hitherto been deemed impracticable. Within these few years, indeed, some valuable breeds of sheep have been brought from the southern parts of the kingdom, but they are generally kept in gentlemen's parks, and are never penned or housed; so that he thinks the quantity of sheep dung applied to tillage lands in the ancient manner is very trifling compared to what it was formerly; that practice existing in those parts of the country only which separate the lands that are generally or closely cultivated from the mountainous districts, where sheep-hut

bandry, on a large scale, and under a regular system, is established and kept up.

Moveable houses have been found in many districts extremely beneficinal in the management of sheep. See Sheep-house.

The farmers of Hertfordshire, as stated in the agricultural account of that county, find much advantage from the raising of manure in these forts of folds. At the Grove the earl of Clarendon is said to have a yard that contains good room for three hundred sheep, the number which is usually kept in it. It is surrounded by an open shed, except on one side, where a barn is the fence; the outside of the shed is formed of wattled hurdle-work, without straw or other materials, for coals, left a greater cloths should make the yard too hot. The whole is kept well littered with stubble, and yields from the above number of sheep eighty large cart-loads of manure. And the system is found to agree perfectly well with the sheep, keeping them more healthy than when they were kept in the fields in the common manner. His lordship has likewise another yard for lambing, which has also a shed connected with it. Mr. Bevan of Norfolk is stated by Mr. Young to have been attentive to this useful practice so early as the year 1792, having then a yard well fenced in for a standing fold, in sight of the shepherd's windows, calculated for littering and folding in bad weather. And that in 1822 he found him continuing the practice, and to be well perfused of the great advantage of it; he indeed considers it now as indispensable, and intends in future to have his flock in for yearning, whether the season be good or bad; having constantly fifteen or twenty loads of hay stacked up in it, for the sheep to help themselves at: he is said to find this not attended with any waste. It is difficult, however, to conceive that a number of sheep can continue pulling hay from a large flack daily, without trampling much of it under their feet, and in that way causing waste of the fodder. It is a much better method to have the hay pressed tightly into racks formed for the purpose with the slates near together, and placed upon low wheels so as to be conveniently moved.

In various other districts of the kingdom, the system of folding sheep in covered folds constructed for the purpose, has been found a highly beneficinal method by those individuals who have had recourse to it; and where it is well followed up during the months of November, December, January, February, March and April, with a sufficient supply of litter, a dung heap of at least from sixty to seventy loads of very good fluff, may be produced from not more than a hundred sheep; which will be capable of manuring two acres of land in a very perfect manner. But the same number of sheep, when folded in the field, where the grass land is even dry enough for the purpose, will not in the same time manure an equal degree much more than one acre of ground. This fully shows the great superiority of the yard method over that of the field.

The latter method, which is now the most common, is to pen or fold the sheep themselves upon the land, which on dry friable soils in particular is found to produce beneficinal effects. They are sometimes, however, folded on old pastures, but more frequently on lands in tillage, especially on fallows, as a preparation for a succeeding crop of wheat, and on light soils, by way of top dress ing after the grain is torn, or on fields of turnips. This last method is most generally adapted in the inclosed and belt improved districts of the kingdom. The hurdles or rails which form the fold are commonly about four feet six inches long, and three feet six inches high, made for the most part of either hazel or willow. About fourteen or fifteen dozen of hurdles are
sufficient to include a statute acre. They are tied to stakes fixed in the ground at regular distances, with small branches of trees twisted when green for the purpose. An acre is considered as a space sufficient for folding from twelve to thirteen hundred sheep. The sheep should never be allowed to lie above one night on the same spot of ground, and not more than twelve to fifteen upon any one patch of land. By thus connecting sheep-influently with the improvement of arable land, much may in many cases be effected, especially upon the more dry and light soils of that soil which is capable of being carried to the greatest extent, and where the quantity of grafs land either in common or otherwise is also considerable.

FOLDE and FOLK-COURSE. See FOLDAE.

FOLDEKEID, in Geography, a town of Norway, in the diocese of Drontheim; 114 miles N.B. of Drontheim.

FOLDING DOORS, in Architects, are those that are made in two parts, each part hung to each jam, and their vertical edges meet each other, lapping the rebates together when the door is shut. See article DOORS.

FOLDING SHEEP, the practice of confining them upon arable or other lands, by hurdles or other means, so as to ameliorate and improve them. This is a method that is much referred to by all open-field farmers as a preparation for wheat, and their chief dependence is upon this species of top-dressing, where the quantity of farm-yard dung is insufficient for or three hundred will trample an acre of land daily. By that connecting sheep-influently with the improvement of arable land, much may in many cases be effected, especially upon the more dry and light soils of that soil which is capable of being carried to the greatest extent, and where the quantity of grafs land either in common or otherwise is also considerable.

Methods of folding.—Mr. Young has observed on this practice, that a very great change has lately taken place in it on inclosed farms, especially with the best farmers in the county of Norfolk. They are now, he affirms, fully convinced that it is an unprofitable system of management, except where the openfields of down and common fields renders it necessary for the purpose of confined. It is contended, that the number of sheep that may be kept on a farm without folding, is much greater than that which can be supported with it. This is a most effectual point; and there is a deduction from the farmer's profit in the injury done to both crops and lambs by folding, which is liable to have been estimated by the most experienced judges, at from 2s. 6d. to 4s. per ewe; so that a farmer should consider well before he determines to follow this practice, which, as the farmers and agriculturists more and more are in favour of, is pronounced unprofitable. Mr. Bakewell considered it as lofty above. And the arguments now urged in its defence are not, it is contended, satisfactory; it is maintained, that if sheep be not folded they will draw under the hedges and other places for shelter in bad weather; so that they ought to be allowed to do it, for more would be lost in such cafs by forcing the sheep from shelter, than the value of their fold. Where this practice takes place, good sheep herds will, in case of rain, get up in the night and let their flocks out of the fold, knowing the consequence of confinement on arable land in wet weather. The instinct of these animals will, it is supposed, conduct them much better than our reason, not only where to fly for shelter, but also for choosing their own time to go to rest, and to feed in the morning. Those they vary according to seasons and weather; but folding prevents it, and forces them to a regularity never called for by the weather, nor perhaps the economy of the animals. It is added, that when he began with to entertain doubts of the propriety of folding sheep, on any farms, in which they can be kept to certain fold, in the night without that practice, he earnestly desired to try
try some experiments that might throw more light upon
the question than it was possible for reason to do; but to
effect this comparatively was very difficult, as the trial
which he has made may not be found deli-
tute of power to throw some light on this interesting
question. The writer is perfectly persuaded that it would
have been impossible for him to have kept on the same land
nearly such a flock in one parcel with folding. It is
not supposed that the fields would have carried three-fourths
managed. Four driving in a day make them trample
much food, disquiet the sheep, and transfer the choice
of their hours of feeding and rest from themselves to the shep-
and his boy. While lambs are young they are injured
by this, and the ewes are liable to be hurried and heated;
all which are objects that should weigh in the question.
When sheep are kept in numerous parcels, it is not only
driving to and from fold that affects them, but it is affected,
that they are in fact driving about in a fort of march all day
long, when the strongest have too great an advantage, and
the flock divides into the head and the tail of it, by which
means one part of the sheep must trample the food to be
eaten by the other. All this, it is conceived, points the
very reverie of their remaining perfectly quiet in small
parcels.
It is, however, supposed, that the question chiefly turns
on the benefit to be reaped by the fold; for if that be great
enough to compensate for the loss by such circumstances,
the practice may not be condemned. It is conceived that
the reason why farmers are such warm advocates for folding,
arises from the power it gives them of sacrificing the grazs
lands of a farm to the arable part of it. Their object is
corn, by which they can carry off a farm whatever improve-
ment they bring to it. Grazs improved is profit to the
landlord in future, and tenants are too apt to think that this
is done at their expense. They do not at all regard im-
poverishing a grafs field in order to improve a ploughed one;
and it need not be observed, that every fort of sheep-walk is
thus impoverished: so that ancient walks which have
been sheep-pastured perhaps for five centuries, are no better
at present than they were before; whereas most fields sheeps-
, fed, without folding from them, are in a constant state of
amelioration; this, it is said, leads him to remark the
effects he observed on several of his own fields. He care-
fully attended, during the course of a summer, many par-
tlemen over the fields, with a view to examine whether the
sheep had seemed to have relod only on spots to the too
great manuring of such, or on the contrary, to have dis-
tributed themselves more equally: and it was a pleasure to
find, that they seemed generally to have spread in every
part, if not quite equally, at least nearly so. The further
circumstance of several old leys fed in the same manner, when
examined in autumn, convinced him, as well as his bailiff,
that the ground had been unquestionably considerably
improved. Those fields had carried a very bad appearance
for some years, but they were, after sheeping, of a
rich verdure, and as full of worm-calls as if they had been
drugged. They were heavily rolled in November, but they
soon became rough again by worms, and demanded much
rolling in the spring. And they had afterwards a greener
and more fertile appearance by far than ever they were
before. It is added, that the whole of this circumstance
is the value of which he thought it quite to appreciate in the trials
of future years, belongs to this method of dividing flocks,
to the exclusion of folding. The fold is valuable, but so
is the improvement of the grafs land, and may, for what he
knows, nearly equal it when in addition however, the
greater number of sheep that can be kept is included, and
the favour done to them by letting them alone, there re-
ains in his mind no further doubt of the fact. It is re-
marked as common to hear flock-farmers in open countries
say, they have not the power to manage so. This may be
very true, it is supposed, upon the major part of the farms,
but such have often many inclosures in which this manage-
ment might be applied without difficulty. But supposing
folding to be the only form pursued, it may be remarked that
the farmers in those parts of the kingdom which under-
stand it best do not extend it so far as they might: they
give over folding in November or December, whereas it
may certainly be carried on through the whole winter with
profit; even supposing that the practice is necessary. On
those farms which have a perfectly dry gravelly pasture or
two, it is advisable to fold all winter on such dry grafs
land. It must not be attempted on most arable land, nor
on moit frag land, but on dry pastures. The safety to the
sheep is greater and the benefit to the grafs an object.
And it is stated that there is another method of gaining
all the benefit of folding quite through the winter, and on
all soils, which is that of confining the sheep in the night in
proper yards, well and regularly littered with straw, bubble;
or by which means a flock is kept warm and healthy
in bad seasons, and, at the same time, a surprising quantity
of dung raised: so great a quantity, if there be plenty of
litter, that the profit will be better than by folding on the
land. And a great improvement in this method would be
giving the sheep all their food, except their pasture, in four
yards, as hay, turnips, &c. for which purpose they may
be brought up, not only at night, but also at noon, to be
baited; but if their pasture be at a distance, they should
then, instead of baiting at noon, come to the yards earlier
in the evening, and go out later in the morning. This is
a practice which cannot be too much commended; for to
warm a lodging is a great matter to young lambs, and will
tend much to forward their growth; the sheep will also be
kept in good health; and, what is a point of confec-
tion to all farms, the quantity of dung raised will be very great,
as has been already shewn.
It has been remarked by the author of the Synopsis of
Husbandry, that the horned or well-country sheep are to be
preferred by the farmer, whose chief intention in main-
taining a flock is to improve and fertilize his arable land;
and that in this respect the sheep forms a very material part
of the husbandman's riches: for to so high a degree may
land be improved by a proper management of these animals,
that, with respect to light soils especially, it is, he con-
tends, scarcely an hyperbole to affirm, that wherever a
sheep hath set its foot, some benefit hath accrued to the
owner. The virtues of the fold are well known; besides
which, the keeping of corn close trodden in the spring, and
thereby counteracting the ill effects of the worm, is a mat-
er of such material import to the reoter of these soils, as to
be sufficient inducement to this practice. These facts are
universally known and acknowledged, that in Hereford-
shire, where every farmer is in a greater or less degree a
maintainer of sheep, it is, he affirms, an established max-
im to diee the gold or ill success of a tenant from the extent
of his fold. While the flock is kept up to its original
number, and the state of fat sheep replaced by an equal tale
of lean sheep, the owner is supposed to be in thriving and
prosperous circumstances. On the contrary, when the
flock is fold off without being renovated by a fresh supply,
the state of such a renter is anticipated by his neighbours,
and too often verifies the truth of their predictions, by a
rapid
FOLDING.

A rapid declension towards bankruptcy and ruin. Such being the state of the case, it may be no unprofitable inquiry, to trace out the several different modes of conducting this busines. There are several ways of conducting this economical plan on an arable farm: first, by the maintenance of a folding flock; and this is either of ewes or wethers. In the former instance, the lambs are reared on the farm and reared for the purpose of keeping up the flock, as the old ewes become fit for the butcher. In the latter, a proportionable number of male wethers must be yearly purchased, to make up the deficiency of those which are fattened, or sold to the feeding graziier for that purpose. But if the farm is not sufficiently extensive to admit of the practice of folding, or the local situation be such as to decide in preference of a feeding flock, the turnips and fow graffes may be appropriated towards the purpose of fattening wethers, or the raising lambs for the butcher, either in pens or in the field; the one distinguished by the name of house, and the other by that of grafs lamb. Whichever of these methods is pursued, it is obvious that a proportionable quantity of ground must be yearly allotted for turnips, tares, ryes, clover, &c.; without which it would be a vain attempt to fix about the maintaining a flock of sheep. But since it is generally in the option of the farmer, with proper management, to raise a quantity of food equal to the support of his sheep, we will suppose that these matters have been properly attended to, the lambs proceed to enhance on each of the methods above enumerated. And first, of an ewe flock kept for the purpose of folding. In order to conduct this plan of husbandry to advantage, a large tract of ground seems to be required. In farms where a due proportion of pasture is united with the arable land, and those pastures lie contiguous to the uplands, to wean lambs for the purpose of folding is a very judicious method. But where there is neither meadow nor pasture land attached to the farm, the busines of an ewe-fold cannot be so conveniently practiced. On many farms in the neighbourhood of Gravesend, in Kent, this plan is observed to be very advantageously prosecuted, from the circumstance of each of these farms having a quantity of marsh land annexed to it, at the rate of fifty acres of marsh to one hundred and fifty of the arable. The method which these farmers pursue is to buy in a number of ewes, equal to the size of their farms. If this purchase is made at the Michaelmas fairs, the ewes are then pregnant; if they be bought at the spring markets, they probably have lambs by their fides, which may go to fold with their dams; the ewes proceed to enlarge the ram in each of the methods above enumerated. In order to obtain lambs at a proper season, let the rams be turned among the flock in October, at the rate of one ram to fifty ewes. Here they are to remain for a month, by which time the greatest part of the flock will be in pregnant; and to ascertain this fact, it is a custom with many people to bemear the fore bows of the ram with tar and oche, which easily leads to a discovery. The breeding ewes may continue to go to fold every night, till towards the third month of gestation. But it is to be observed, that in folding either ewes or wethers, but more especially the former, a field of turnips should be provided near the close where they are to lodge in the winter nights, that the flock may not have too long a drift; for these animals are but forry travellers at best; and in the winter time, when the roads are become deep and miry, and the ewes begin to be heavy in lamb, a long drift would be highly prejudicial to them. Where such a turnip field does not lie handy to the fallow, it will be improper to prosecute this busines with an ewe flock, after the wheat has been down in November. When the folding is discontinued, the ewes should be driven into a pasture, where they may be quiet and undisturbed, and be often visited by the owner, to watch with a careful eye any accident that may befall them; for sheep, at all times an helpless race, are liable to a variety of misfortunes in the time of gestation, peculiar to that condition. Towards the latter end of February, the ewes will be come time their time for lambing, and should then be removed from the marshes or low pastures, and driven into the turnip field, or turned on a piece of dry upland pasture. If the farm hath produced a quantity of turnips sufficient to fatten the wethers, a portion of which will be yearly turned out of the fold, in this mode of conducting busines, the ewes, for four or five weeks previous to the time of lambing, may be lodged on that part which the fattening sheep have gone over, where they will find an ample sufficiency from the shells which were left by their predecessors; as these females do not require to fill an allowance of meat as will be necessary for them after they shall have yeaned; and too great a plenty would be very detrimental to them. But this is to be observed, that proper care should be taken to prevent the wethers from breaking into the part defined for the ewes, which at this period require the most diligent attendance from the shepherd, not only to watch the disorders and accidents which may befall them, but to maintain the fences in good repair, and to see that the hurdles are kept tight in the ground; and to prevent the wethers from drifting, both of which would be apt to seize the lambs as they fall.

Summer folding.—This should commence early in the spring season, as soon as the lambs are in a state fit for it. The lambing season generally commences about the first week in March, when the shepherd will find ample scope to exert his skill and diligence. As the weather at this season of the year is generally unsettled, and the cold often more severe than in any former part of the winter, the lambs, as well as ewes, frequently perish through the inclemency of the season. As the ewes have lambed down, it will be proper to remove them, with their lambs, into a piece of turnips, fenced off for the purpose, where they may neither be annoyed by the lambing ewes, the fatting wethers, or the flore sheep, if there are any in the same field; and which, as has before been observed, should be kept separate from the ewes. In this field, with the daily allowance of a small portion of turnips, the ewes will continue to yield abundance of milk; and, in consequence of that, the lambs will grow fat, especially if the weather shall prove warm and sunny. When the lambs become ten days or a fortnight old, the hurdles should be placed in such a manner as to leave a vacancy at bottom, in different parts of the drift, where the lambs may creep through, and take their range among the standing turnips. By this management they will enjoy a free air, and a licence to nibble on the turnip tops; but which circumstances will greatly contribute towards their future growth. When the sheep and lambs shew by their bleating and meaneats that they require a change of food, which they will pine after when the turnips have advanced far in growth, and the drifts are become fatlefs, and the bottoms void of nourishment, they should no longer be confined on the turnip field. In forward springs, the turnips will be found to be of little use for couples (sheep and lambs) after the middle of April, at which time the lambs will be fit weeks old; let them, therefore, be removed out of the turnip field, and driven on the rye, a few acres of which should, in every autumn, be turned on farms where there is maintained a large flock of sheep. Indeed the rye often affords a good bive early in the month of February, in which case the
the blade should be eaten down, and a second crop will have sprung up at the time he is now speaking of. Let this rye be parted into divisions of two or three acres each; observing the same caution, with respect to the openings at the foot of the hurdles, as was mentioned in the feeding of the turnips. In very backward springs, it frequently happens that the turnips are all eaten off, as well as the first bite of rye, before the grass has made an effort to shoot, and the farmer is under the necessity of turning his couples into the marshes by the latter end of March. In order to be provided with a remedy against this untoward event, it is a prudent measure to lay in a piece of grass in the autumn, wherein there is a large quantity of old hay, and to suffer it to be flocked during the winter; by this regulation, the young grass will shoot much earlier in the spring among this old straw, than in those marshes that have been taken off more closely by the scythe, or depasturing, and will, in all probability afford an early bite for the ewes and lambs, when the winter feed of the uplands shall be exhausted; and as a shift of wind and change of weather may shortly be expected, this will cause the rye to send forth a fresh shoot, and furnish a variety in the pasture, which, with occasional shifting into the marshes, and perhaps on a piece of forward wheat, will generally lengthen out a supply of food for the couples, and maintain them in tolerably good heart, even in those springs which are the most backward, till the winter tares become fit for their reception. In a kindly time, the grass in the marshes will have attained to a decent length, so as to afford a good bite for the sheep by the last week in April, to which time the turnips and rye will have been competent to the maintenance of the ewes and lambs. Towards the latter end of April, or beginning of May, or perhaps the middle of that month, as the season has been more or less favourable, the winter tares will have got to a sufficient height for feeding. Those who have been accustomed to this mode of husbandry will easily conceive the necessity of suffering the tares to grow to the period when they shall be nearly fit for the scythe, before they are fed off; namely, that at this time they yield the greatest and most lasting quantity of pasture. To this end, the field should be parted with hurdles according to its size, and the number of sheep to be grazed thereon: and let the ewes and lambs be brought out of the marsh when their bellies are full, and driven into the tares; observing that this be not done at a time when there is any moisture hanging on the haulm, either from dew or rain; for, as the pasture arising from their pulse is exceedingly succulent, the sheep would run great hazard in feeding on it when replete with moisture, as he has more than once experienced to his cost: this animal, like all others of the ruminating tribe, being very subject to a disorder from repletion, termed brugia, and on this account, likewise, the folding flock, when first driven on the tares, ought to go thither with full bellies, to prevent their feeding on them with too great eagerness and avidity. At this time, the lambs will have gained sufficient strength to a degree of being folded with their dams, if it should be found necessary to the farmer's occasions to pursue this method. But in this case, it is to be supposed that the field which is to have this dressing be at so great distance removed from the clow of tares; otherwise the drift will prove highly prejudicial both to the ewes and lambs. The summer fold is generally pitched on a fallow, intended to be sown with turnips in the course of the season; and this business usually commences in May. A fold for three hundred ewes and lambs may be made to include eight rods of ground; and if the turndale shall not seem to be dropt sufficiently thick from one night's drifting, the sheep may lie a second night in the same place, rather than incur the hazard of injuring the health of the couples by confining them in too narrow a compass. The time when the sheep and lambs should go to fold is about eight o'clock in the evening, and to be released at five in the morning. Such wether lambs as are intended to be fattened, or double couples, where the ewes do not give a quantity of milk equal to the demand of the lambs, or any others which may be observed to sink in flesh, may, with their dams, be taken out of the fold, and maintained in a separate pasture, where the grass has attained a sufficient head; and such of the folding ewes as appear to be weakly, or dil tempered, may, from time to time, be removed to the same pastures above mentioned, and suffered to lie in quiet, till they are judged able to return again to the fold.

It is added, that as it is likely that there will be some dry sheep in the farm, confining of the two yearling wethers and tags, these are to be kept on more ordinary pasture than the ewes and lambs; and as they have hitherto followed them in the turnips, so they must likewise succeed them on the clover and tares. The couples are to be allowed the first bite, and the dry sheep are then to be turned into the field. In the marshes likewise the same method should be taken, of referring the more forward growths for this part of the folding flock: by such management there will be two folds at work in the same instant, and the shepherd will find ample employment throughout the day.

After the tares are eaten off, the clovers and trestail will be ready to receive the flock, and here the sheep and lambs are to precede the dry flock; and the fields, if extensive, should be parted with hurdles, that the sheep may not flanue the whole piece before they have eaten half the field, which would ineffectually be the consequence if they were permitted to range over a large elose; for it is the nature of this animal, when turned at first into a field, to take a range over the whole superficies before it will settle on its feed. It follows, therefore, that a division of large pastures will lengthen out their abode in them; small inclosures do not require it, which, by the bye, shows the advantage of these contracted pieces over those of wider extent; for in such small fields the sheep lie much warmer in the winter, and a considerable expense is saved in hurdles, which in great fields are required in great abundance, besides the labour of setting them, and the necessary delay of time when the last must be taken off from other work to draw them and to. As the result, small fields, to a farmer who places much dependence on his flock, are far more commodious than large ones; but for corn the preference is to be given to those of wider domain. A good shepherd will be careful that his flock be driven late to fold in an evening, and released early in the morning from their confinement, in order that they may enjoy the coldest parts of the day on the feed. He will be cautious that they are allowed a sufficient time to graze in the uplands previous to their being driven into the fold, that they may retire to rest with their bellies full, by which the quantity of dung and manure will be considerably augmented. He will likewise be careful in reviewing the hurdles, and provide that there are fixed tight in the ground; lest by any accident they should be thrown down during the night, and the flock by these means get into catchet or internes with other sheep; he will count his sheep regularly every evening when he drives them to fold, and take a fresh count in the morning when he turns them to their feed; he will, previous to dismissing them from the fold, warn them gently round the same, in order to cause them to dung and stale plentifully, that the nature may be left in the fete, other-
wife the greatest part of the trundles will be dropt on the road, or carried on to the marth, where, lying thin, this drefling can do but little service, and where it is not wanted in any degree.

After the flock have been flour, as they are very tender for some time, it will be adviseable to keep the flock, out of the fold for a week, and, during that time, not to turn them on any pasture where there are thistles or other annoyances. If the weather should prove hot and dry at this feafon of the year, the natural graffes and clovers are generally flour, and the farmer is at a lofs for a baiting-place whereon to turn his flock previous to their going into the fold, unless he hath had the foresight to raise a piece of spring farres for this ufe. At this time, likewise, the fold, ground works like ahes, and, by the heat of the sun, a great part of the invigurating juices arising from the dung and urine of the sheep is evaporated, fo that it may be well questioned whether it be productive of any material advantage to fold the sheep at this feafon. That the sheep are greatly injured from being folded under these circumstances, especially if their drift is at any distance, with the interruption of a daily turnpike-road, for a quarter of a mile or more between the marth and the fold, as is frequently the cafe, he is fully convinced; it would, therefore, perhaps, be a great advantage to keep the flock out of the fold till the rains about Midsummer, when a day's work may be ploughed, on a lay intended to be sown with wheat in November, and the fold immediately let on that part, and so to proceed on the ploughed ground; and thus the folded surface, although the sun should still continue hot, and quicken exhale the moisure of the dung and urine, will nevertheless enjoy an exclusive benefit of being clofly prifled by the tread of the sheep, which will prove of infinite service, and which could have been of no ufe on the turnip fold, where the fold had hitherto been let. After weaning the lambs, by continuing the fold at work on the hay in the manner before noted till November, a fack of two or three hundred sheep will have drefsed a considerable breadth of new lay ground, and the wheat may then be harrowed in. But now commences a method of folding, which is of more importance than any which has preceded it. This is, to fold on the wheat when fown, the method of which is as follows: first, low a day's work on a lay that has been ploughed over fince the Midsummer rains, and when the land is fit to be fold, and let the fold fill the fold, and let the fold flow; and fo continue every night till the whole is completed, unless there should fall so heavy a glut of rain as to make it unavoidable to lodge the fold on the damp ground; otherwise there will be no fear of treading the fold too close after fowing; for on light fows, a firm furface is absolutely neceffary towards the future welfare of a wheat crop, especially when this grain is fown on hay, which, if not well trodden, is subject to be much eaten by the worm; but there need be no doubt of the corn forcing its blade through the hardened furface, although from its appearance a perfon unacquainted with this bufiness would deem it impracticable. When the fold shall have gone over this firft drift, let another day's work be ploughed, fown, and harrowed in, and the fold continue to run over the fame in like manner as before directed, and fo proceed till the wheat feafon is finished, and the corn begins to germinate, when it will be proper to difcontinue this practice as quickly as possible, as injury would be done to the crop.

Winter folding.—At this period the fold may commence their winter folding, the manner of which is thus explained. And if it is supposed that the farmer has taken care to provide a due allowance of meat for his fold on the uplands, as likewife a fufficient flock of hay or pea-feaf for them to browse on whilst in the fold, during the long brumal nights; for at this feafon they will require some influence in the night, which at the summer folding was not neceffary to be given to them. Let the fold be then pitched on a tufted, intended to be ploughed up in the spring for a fallo, and let it be made considerably larger than the summer folds. A flock of three hundred fold ought not to be limited to a fpace of ground than forty rods, which is a quarter of an acre, in which there ought to be placed a fufficient number of ranks, filled with hay or pea-feaf; and in this fold they may lie two or three nights, at the option of the owner. Whilst the weather continues mild and open, and is not attended with too considerable a proportion of moisture, the fold may run in the marths during the daytime, and be bailed in the uplands, on a piece of young clover or other succulent fowd towards the evening, previoufly to their going into the fold; but when the weather becomes cold and wet, with a few winds, they must now longer be driven into the marth, but be maintained altogether on the fold, and there fold out during the cold nights; and if it does not put the farmer to apportion any of his winter fowd for his folding fold, the bufineses must be altogether relinquished, since it would be highly improper that the fold should have so long a drift in the depth of winter. Whilst the bufineses of the fold is going forward on the tufted, in the night, as before mentioned, the fold may be employed during the day in treading the wheat, a practice of great utility both in the autumn and spring, and which in some degree answers the end of the fold, to part of the land which had not partaken of this advantage. In the winter folding the lambs ought not to share in any degree, though they are sometimes penned in the fold with the fold after weaning-time. Towards Christmas, it will be proper to difcontinue the fold fold entirely, as the ewes then get heavy in lamb, and might be greatly injured through a longer continuance of this practice. At this time, therefore, the breeding ewes should be turned into the marths, to lie quietly during the time of gelation; and if the folding be any longer continued, let it be with the young wethers and ewe tags, which are the least liable to injure it.

Thus the winter folding being finished, suppose the feeding wethers to be on turnips, and the lambs and young fold on the grattus, with occasional foldings on the shells of the turnips, left by the fattening fold, and the breeding ewes quietly lodged in the marths or low pasturage lands.

We now come to the method of conducting a folding flock of wethers, which is generally adopted by those farmers only who pollers not the advantage of breeding land, as from what has been mentioned on that head, and what remains to be said on this, it will appear, on a comparison, that the balance is much in favour of the breeder, where the situation of the farm will allow of the practice. But in order to maintain a folding fold where there is no marth land or natural graffes attached to the farm, it will be necessary that the arable land be sufficiently extensive to admit of raising annually a quantity of turnips, rye, oats, clover, and trifol, in proportion to the exigencies of the flock; and if the farm lies in a neighbourhood of an extensive common, the bufineses of folding may be carried on to a much greater advantage. The fold which are best adapted to this purpose are those of the large Wiltshire or Hampshire breeds. But these are not calculated for the purefane of the farmer who wishes to profit by his fold,
and afterwards to fatten his flock on turnips; since it is
great odds if he will be able to provide them with meat,
equal to maintaining them in the condition wherein he
bought them, and by consequence he must either discontinue
his fold, or be content to see his flock dwindled, and become
of less value the longer they are kept on the farm. But
where the purchase is made with a view of penning them
immediately on turnsips, to fatten for the butcher, such
large wethers may be very proper. Hampshire wethers are
somewhat less than those of Wiltshire, and either thefts,
or the inferior kind of Wiltshire, are best adapted for fold-
ing.

It is added that wethers are purchased by the husband-
man at different ages, according as the economy of his farm
directs his views. If lambs are preferred, these are to
be bought at the antumnal fairs, and will require to be
kept a twelvemonth before much benefit can be expected
from them, as the folding them at this early age, during
the winter, might prove highly prejudicial to their growth.
Four-tooth sheep, or two-yearlings, are likewise left in at
the autumn, and will come into work immediately. As to
the six-tooth, or three-yearlings, and full-mouthed-sheep,
there are rarely if ever bought with a view to keep as
flees; for being arrived at their full growth, the profit to
be expected from them, except for immediate fattening,
will not be considerable; and when sold off in the suc-
ceeding winter, the owner must again have recourse to the
like expedient of renewing his fold, which would occasion
a considerable drain of ready money, and not fully answer
his purpose. Whereas, by purchasing young flock, either
lambs or tags, the original price is lower, and the los of
those which die by caulsality will consequently be less
severely felt; besides that these sheep, having been insured
to the fold, will be found to go through their work with
greater facility, and the hazard of their dying will be
lessened in proportion to the time they have been resident
on the farm. For these reasons, the farmer who keeps a
wether flock should make purchase either of lambs or tags.
These tags, or two-tooths, are to be met with at the spring
fairs, and may be folded after having resided for a few nights
to recover themselves from the fatigues of the dust. A good
shepherd is equally useful to a person who keeps a wether
fold at work, as to the breeding farmer.

And now supposing the winter fold to commence at
Michaelmas, the sheep at this time are to be driven to and
from the fold, at the same hours as was directed for the
ewes, and when released in the morning should be turned
to graze on the common, where they are to continue till
two or three hours before the time of folding, when they
are to be brought home and bated on a piece of clover or
other paturage, where there is plenty of harvestage, that they
can enter the fold with full bellies. As the grass on the
common falls off, it will be proper to relinquish this
pasture, and take the flock into the meadow: here, as in the
walks, clover, &c., of which by proper management, there
will be always great buress remaining on farms of any
extent, where this mode of husbandry is pursued; and when
there is not a large tract of arable land, that sheep feed may
be yearly raised in abundance, it will be usefull to at-
tempt it. These pastures then, by favour of the antumnal
rains, we will suppose, have thrown out a tolerable bite of
grafs by the time the flock is taken off the common: and
from hence the sheep may be folded, till the state of the
weather renders it necessary to remove them on the turnsips,
of which the writer likewise presumes there is no deficiency.
From the turnip field they may be driven every night into
fold, till the further progress of the winter renders it ne-
essary to discontinue this business. In folding wethers, it
is prudent to take in a large compass of ground in the
winter time, as hath been before observed in speaking of the
ewe fold. Racks filled with hay and pea haulm should be
flaizing at this season within the fold. As there will be
annually a number of the full-mouthed sheep drafted off for
fattening, and as such forward wethers will have been
some time at turnsips before it is necessary to turn on the
tore sheep, these latter may succeed the former wethers,
and be made to eat up the hulis which they had left behind.
As to the lambs, these should be always kept to a good and
plentiful diet during the winter; by which management
they will probably gain a larger size than they could have
possibly reached if they had not been allowed a great
plenty of meat whilst they were young. The same rule
holds with colts, calves, and other young animals, which, if
fattened in alimint during their growth, will always carry
with them sufficient marks to denote this improper man-
agement throughout the remaining part of their lives. This
being the case, it is evident that some of the belter pature
and most prolific gratiens should be allowed for the lambs
till the turnsips are ready for feeding, when this young
flock ought to come in for their share of that root. By
this mode of treatment they will make large tags in the
next year, and prove a valuable addition to the fold. In buying
lambs, which are hereafter intended to compose a folding
flock, the purchaser will do well to be directed more by the
size of the young creature than by its corpulence. As the
spring advances, the fat sheep will continue to be fold off,
which will enlarge the circuit for the store wethers, so that
on land in any degree kindly for the cultivation of turnsips,
a sufficient quantity of this root may be raised for the
winter support of the folding flock. As to those sheep
which are intended to be fattened, it must never be per-
mittet for them to entrench too far on the provisions of the
fold; therefore, when the turnsips are flight, it is found
to answer better the interest of the farmer to sell the
full-mouthed wethers out of the fold at Michaelmas, than to
suffer them, on the expectation of bringing in some ready
money towards the spring, to devour the meat which
ought to have been reserved for the flock, and without
which the store sheep will sink in flesh, and the farmer in
the end will be considerably out of pocket in the prosecution
of this scheme. When the turnsips are eaten off, the flock
may be turned on the rye; or if this feed hath got to a
good bite in the month of February, which frequently
happens in mild winters, and on land that is in tolerably
good heart, the folding wethers may be occasionally shifted
from the turnsips to the rye field, and when they have
eaten down this latter, be removed back on the turnsips,
and afterwards driven again on the rye when the blade
shall have arisen to a second bite; observing that this food
should never be allowed to stand till it begins to be on
spindles, for after that time it spoils its succulence, and
becomes unfit for this use. It is therefore in the ear-
ly part of the spring, only whilst it continues in its larbaceous
state, that rye is for any use for sheep feed: as in a forward
spring it forms its spindle towards the beginning of April, it
should seem that no material benefit can be derived from it after those winters which
have been attended with a considerabe length of frost,
so as to prevent it from growing to a head for sheep
feed in the months of February and March; for it is in
these two months when rye is of the greatest advantage.
In very backward springs, however, rye may continue to
be fed much later than the period here mentioned, and be
found very useful at such times, when, from the vagu-
ness...
weather in these late springs, the rape and clover fields are
flagrant in their vegetation and growth.

The whole of the fields of rape and turnips having been
fed off, the rape grafts will by this time have formed a
shoot, and will afford a wholesome food, on which, with alternate
removals to the old lays and young clovers, the flock will find
sufficient pasturage till the time advances for turning them
on the common, when the summer freezing will commence.
The lambs which were bought in at the fall spring fairs are
now become tags or two-yearlings, and those which were
bought in tags at Michaelmas are become four-yearlings, or
two-yearlings. These will now all of them go to the fold
together, and feed in the same pasturage, that is, on the com-
mon during the day time, and in the evening, previous to
the time of folding, are to be halted on the clover, &c.
that they may go into the fold with full bellies. At the
spring fairs may be bought to supply the place of those
old sheep which were fold off, and these may conveniently
go to fold with the rest; and if at Michaelmas it should be
found necessary to increase the number, either lambs or two-
yearlings may then be purchased, at the option of the far-
mer; and by this management, if the matter be cautious
in laying out his money, and the shepherd diligent in his office,
a wether flock may be maintained to great advantage on
those farms where there is a considerable tract of land,
and an adjoining common. And thus by laying out the
most fertile part of the land and that which is at the
farthest distance from home, with rape grafts, and when worn
out to plough it up, and after having hipped one crop of corn,
to sow it again with rape grafts, and by folding on such part
of the land as will admit of being kept in tillage, with alter-
nate growths of clover, trefoil, &c., the poorest soils
may be made to answer the purposes of the husbandman.
And it is by the prosecution of this mode of agriculture
alone, that such poor, thin, and hungry ground can be cul-
tivated to any good account; for if the rector, either from
want of money, or through ignorance, should neglect to
keep a folding flock on their barren farms, and place his
whole dependence on the plough and the seed-crop, a few
years would convince him of his error, and, unless his re-
sources were very ample, bankruptcy and ruin would inevi-
tably ensue.

It has long since been remarked in the third volume of his
“Essays on Agriculture and Rural Affairs,” that much
amelioration and improvement may frequently be effected in
bringing waste land into cultivation, by the folding of sheep,
provided it be conducted with care and attention to the fa-
tion, the nature of the land, the course of crops, and the
having a sufficient number of folds, according to the ex-
tent and situation of the land.

FOLDS. in the Manufacturer. See Cloth, &c.
Folds of the Draper, in Painting. See Drapery.

FOLENGIO, or FOLENGUS, JOHN BAPTIST, in
Biography, was born at Mantua in the year 1490, and at
the age of sixteen he entered into a Benedictine monastery
in his native city, where his talents and industry obtained for
him a high reputation for proficiency in literature, and fas-
ced criticism, while the excellence of his composition ren-
tended him an object of general esteem. He was selected to
fill the most important and distinguished stations in his or-
der, and he was afterwards chosen by pope Paul IV. as vi-
lator of the Benedictine foundations in Spain. When he
had performed this task he had returned to his native coun-
try, and devoted himself almost wholly to theological studies.
His mind was liberal, and he was diligent in reforming
the church, and of uniting Catholics and Protestants in one
communion. After a life spent in the service of his fellow
creatures, he died in 1559, in his seventieth year. He left
behind him many theological works, of which the principal
were “Commentaries upon the Epistles of St. James, St.
Peter, and the first epistle of St. John,” published in 1555
in 8vo.; also a “Commentary upon the Psalms.” These
works were distinguished for erudition, piety, and liberal-
ty, and were soon prohibited by the church of which he
was an ornament. The latter was reprinted at Rome by or-
der of pope Gregory XIII. in 1582, being first revised,
and curtailed by some offensive passages. Dupin, speaking
of the labours of Folengio, says, that he “writes purely and
nobly, and Thuanus had reason to say, that no man will ever
repent the reading of his commentaries.” Moreri.

FOLENGO, THEOPHILUS, known in the poetical
world by the name of “Merlin Eoccyno,” is celebrated
for the species of poetry called macaronic. He was born
at Cipano, near the lake of Mantua, about the year 1491.
He was, in early life, initiated in the studies of polite
literature and philosophy, and at the age of sixteen entered
the order of St. Benedict, and changed his name of Jerome to
that of Theophilus; but his passions were ill adapted to the
conditions of a monastery, and he passed eleven years,
after he quitted the cloister, in a rambling kind of life,
during which he composed and published at Venice his maca-
onic verses. This mode of writing, which has not very fre-
cently been adopted with success, confuses in interweaving
Latin verse a number of words and phrases in the ver-
colour tongue, thrown in at random, and made to fit the
meter by Latin terminations. Folengo, if not the inventor
of macaronic verse, was the first who brought it into vogue.
He was, however, capable of a higher species of compo-
sition, and would probably have excelled in pure and elegan-
t poetry, had not the love of novelty led him into this extra-
vagance. The late learned Dr. Geddes, the translator of
the early books of the scriptures, wrote, about the year
1790, two or three macaronic poems, which he circulated
among his friends. Folengo returned to a religious life in
the year 1526, and published the “Chias del Tribunumo,”
which is descriptive of the various incidents of his life, end-
ing with his conversion. He then retired to a small monas-
tery, where he endeavoured to expiate the fault of his looser
writing, by composing a poem entitled “La Umanita
del Figlio Di Dio.” After this, we find him at Palermo,
where he composed a kind of drama representing the cre-
tation, the fall, &c., and some religious tragedies. He died
1533 in the monastery of S. Croce de Campe, in Pa-
dus, and was interred with great pomp. The estimation in
which he was held was exhibited in the erection of a magni-
ficent tomb, on which were inscribed several epitaphs in
various languages. Moreri.

FOLIÈKUNDA, in Geography, a town of Africa, in
the country of Koster.

FOLIA, in Botany, is used for the leaves of plants, and
also of flowers, but particularly the former; the leaves of
flowers being more properly called petala.

FOLIACEUM EXTRANSUM, in Anatomy, is that ex-
treme of the Fallopian tube next the ovary, and which is ex-
panded like the mouth of a trumpet, and insonned with a
fort of fringe.

FOLIAGE, a cluster or assemblage of leaves, branches,
leaves, &c.

Foliation is generally used for representations of such
flowers, leaves, branches, rings, &c. whether natural or
artificial; used as enrichments on capitals, friezes, pediments,
&c.

FOLIANUS, Liberius, of Modena, in Biography,
a writer on the theory of music, published a Latin treatise,
FOL.

In 1523, at Venice, folio, with the following title: "Musica Theorica, Ludovici Foliani Muticensis: docta futilis ac dilecte prætrata: in qua quaplurum de Harmoniciis interdixit, non pingat tentas, continente speculations."

The theory of music by Luigi Folgiano of Modena, in which are contained and learnedly elucidated many harmonica speculations relative to the intervals of music, never before attempted. This work is divided into three sections: in the first the author treats of musical proportions; in the second of consonances; and in the third of the division of the monochord. In the second section a foundation seems to have been laid for a musical controversy, which was afterwards agitated with great warmth; this author, contending for the doctrine of Boethius, from whom two-thirds of his book are taken, for the distinction of greater and less tone in the diatonic rectorch. The title of one of his chapters being, "De utilitate toni majoris et minoris." Harmony now began to be felt, and was improving and refining, and as there was no melody till the lyric theatre was established, and folio fongs, fine voices, and refined thinking were cultivated, it was occupied by professors and dilettanti, philosophers and mathematicians. We know not what rank Fogliano held in society if he was a professor, he adhered too exclusively perhaps to mathematics, and the science of harmonics, to be much used to practical music; and if a mere mathematician, the real beauties and refinements of the art must be unknown to him. However, to Fogliano is ascribed the first idea of introducing a temperament into modern harmony. Boethius, Guido, and Franchinus, were silent on the subject. The organ was tuned in such a manner as rendered a few keys perfect at the expense of all the rest. There was no instrument that could make occasional temperaments but the violin, and that was wholly unknown in concerts at the beginning of the 16th century. Wind instruments, and all keyed and stringed instruments, in which one note was obliged to serve different purposes, were forced to submit to false intonation, and the exclusion of all tempered keys, till temperament gained ground, and the doctrines of Didymus and Pulemy were adopted, which were in favour of major and minor tones, and semi-tones; and those who enjoy the harmony of thirds, which, without temperament are intolerable, owe their pleasure to Fogliano for recommending them, and to Zarlino for securing his endeavours. See Didymus, Pulemy, and Temperament.

FOLIATE, in the Higher Geometry, a name given to some to a curve of the second order, expressed by the equation $x^2 + y^2 = ax + by$, being one species of defective hyperbolas, with one asymptote, and consisting of two infinite legs crossing one another, and forming a forkt of leaf.

FOLIATING of Looking-glass, is the spreading a composition of something which will firmly adhere to the back of the glass, and thus reflect the image.

This composition is called the foil, and is usually made with quicksilver, mixed with tin, and some other ingredients. For the method of foliating looking-glasses, both plain and globular, see looking-glass.

FOLIATION, in Botany, &c. is used by Dr. Grew to express the assembly of the folia, or petals of a flower. The foliation is the most conspicuous part of flowers, being that collection of fragrant coloured leaves, which constitutes the compass, or body of the flower.

It is of great use in the generation and preservation of the young fruit, or seed; it filtrates a fine juice, to nourish it in the uterus or polar.

In some species, as apricots, cherries, &c. it likewise serves to guard the young tender fruit from the violence of wind, weather, &c. For this being of a very tender and pulpy body, and coming forth in the colder times of the spring, would be often injured by the extremities of weather, if it were not thus protected, and lodged within the flowers. Before the flowers open, the foliation is curiously and artfully folded up in the calyx or petalium.

Dr. Grew enumerates several varieties of these foldings, viz. the close folded, as in roses; the semi-closed, as in the Blattariae; the fleshy, as in pea-blossoms; the fold and flat, as in marigolds; and the oval, as in the ladies bower.

FOLIES, Fr. Folhia, It. a Spanish dance, formerly in high favour. It is composed on a ground with variations, and danced by a single performer a pas seul. Corelli's twelfth folio, consisting of 24 variations on a tune called "Tarnell's ground," which is laid to have been composed at Hanover on purpose for Corelli to exercise his fancy upon, by a German musician of the name of Tarnell; but unluckily, Corelli never was at Hanover, and this ground, on which he worked, was an old Spanish dance, long before Corelli was born.

FOLIGNO, or Folinio, in Geography, a town of Italy, in the province of Umbria, the seat of a bishop; built on the ruins of the ancient Forum Flaminii. According to its old constitution, it was governed by seven magistrates, called "Septemviri," who are changed every two months. It contains eight churches, and many convents, and though it has some good streets, it has neither squares nor town-houses: its chief business is confectionery, paper making, and manufacture of silk. In 1756 it was taken by the French; 10 miles N. N.W. of Spoleto. Lat. 42° 55'. E. long. 12° 15'.

FOLINGRE, a town of Sweden, in Jamland; 30 miles N. of Otterlund.

FOLIO, or rather Folium, in books of account, signifies page.

Thus folio 7, written abridgedly F 7, denotes the seventh page, &c.

Folio recto, or F R', expresses the first side or page of a leaf.

Folio verso, or F V', the second or back-side of the leaf.

The word is Italian, and literally signifies leaf.

Folio, among Book-keepers, a book in folio, or simply a folio, is that where the sheet is only folded in two, each leaf making half a sheet.

Beneath the folio are the quarto, octavo, duodecimo, sexten, twenty-fours, &c.

FOLIS, or Follii, anciently signified a little bag or purse; whence it came to be used for a sum of money, and very different sums were called by that name: thus the scholiast, on the Bibles, mentions a follis of silver, which was worth the twenty-fourth part of the minas: the glosse noun, quoted by Gronovius and others, one of a hundred and twenty-five minas, and another of 253 denarii, which was the ancient sextarius; and these different sums of eight, four, and two pounds of gold, were each called follis. According to the account of the scholiast, the ounce of silver, which contained two hundred of fifty in the pound, was worth a hundred and twenty follis of copper. The glossographer, describing a follis of two hundred and fifty denarii, sa it was equal to three hundred and twelve pounds of ounces of copper; and as the denarius of that age was the eighth part of an ounce, an ounce of silver must have been worth a hundred and twenty ounces of copper; and, therefore, the scholiast's follis was an ounce.
ounce of copper, and equal to the glossographer's nummus. But as Constantine's copper money weighed a quarter of a Roman ounce, the schollak's folios and the glossographer's nummus contained four of them, as the ancient nummus contained four ares. See Phil. Trans. vol. 18. p. ii. p. 515. &c.

FOLIUM, in Botany and Vegetable Physiology. See Leaf.

Folium Branchiæ, the leaf of the gills, a term used by some of the ichthiologists, to express that part of the gills which looks red and fringed. The gills of fish are composed of certain bony circles, which are formed on the convex side with a great number of laminae; these serve to receive the ramifications of the arteries, and are called the folium or leaf of the gills. The aorta or great artery reaches no farther than this part of the gills. It has no descendent trunk, but every part of the body is supplied by a large venal trunk, formed by the joining of the several smaller trunk of the several circles of the gills.

Folium Indicum, or Indicum, called also tamaralapatra, and malabathrum; a leaf brought from the Indies, growing chiefly about Cambay, produced by a tree not unlike the lemon-tree; used in the composition of Venetian red.

FOLKES, Martin, in Biography, an eminent philosopher and antiquary, was born in Wethamstede in the year 1695. He was educated under Mr. Cappel, formerly Hebrew professor at Sæomur, but at the age of 17 he was sent to Clare-hall, Cambridge, where he pursued the studies peculiar to that university with so much affability and success, that he was elected member of the Royal Society before he had completed his twenty-third year. His communications to this learned body were so much esteemed, and his understanding so highly appreciated, that he was frequently chosen into its council. He was in habits of friendship with the illustrious Newton, at that period president of the society, and by his influence Mr. Folkes was elected one of the vice-presidents in 1733; and at the death of that great man in 1727, he was candidate for the vacant chair, but the superior interest of Sir Hans Sloane rendered his application unavailing. The contest was probably carried on without that bitterness and animosity which occur too frequently on occasions of this fort, for we find Mr. Folkes still in the council, and vice-president till the year 1733. During this and the two following years he resided for the most part in Italy, improving himself in the knowledge of classical antiquities. Here he laid the foundation of his works on ancient and modern coins, having by his situation ample opportunities of ascertaining their weight and value; the result of which he laid before the Royal Society on his return from the continent. He likewise read before the same body memoirs upon the measurements of Trajan's and Antonine's pillars, together with other remains of antiquity. A table of all the English gold coins, drawn up by Mr. Folkes, was afterwards printed at the request of the Royal Society, before whose he laid his "Remarks on the Standard Measure preferred in the Capitol of Rome," and a model of an ancient sphere preferred in the Pantheon. A representation of this sphere was published in Dr. Bentley's edition of Manilius. Mr. Folkes visited Paris in 1739, where he was received with great respect, and was introduced to the company, and obtained the friendship of the most eminent literary characters in that metropolis. On the abdication of Sir Hans Sloane in 1741, he was elected to the honourable office of president of the Royal Society, and in a very short time he was nominated to succeed Dr. Halley as one of the eight foreign members of the Royal Academy of Sciences at Paris. In 1745 he published a thin quarto volume, printed at the expense of the society of antiquaries, his very valuable "Table of English silver coins, from the Norman conquest to the present time, with their weights, intrinsic values, and some remarks on the several pieces." In an appendix to this work we have an account of the "Coins minted in Scotland since the Union of the two Crowns:" and "A table of English gold coins from the eighteenth year of King Edward III., when gold was first coined in England, to the present time." He intended to have illustrated the folium by plates, which he had prepared; but he did not live long enough to publish. They were, however, purchased by the Antiquarian Society, and published some years after his death. Mr. Folkes, in addition to his many other honours, had conferred on him the title of doctor of laws by both universities, and he was also chosen president of the Antiquarian Society. He died in the year 1754. Dr. Birch collected materials for a life, which are preferred in the anecdotes of Bowyer. He was a man of very extensive and accurate knowledge, and he was distinguished in private life for politeness, generosity, and friendship. Biog. Brit.

FOLKINGHAM, in Geography, though a market town in the hundred of Aveland and division of Kesteven, in the county of Lincoln, distant from London 107 miles, is but a small place, situated on the side of a hill, abounding in springs, containing 99 houses, and a population of 531. The church is a well built structure, having at the west end a handsome lofty tower surmounted by eight elegant light crocketed pinnacles. The feoffes-house has lately been built, and the houses in general have a commanding view over the extensive adjacent flats. It possesses little trade, and the small market is held weekly on Thursdays. Folkingham was included in the one hundred and thirty-one manors in the county of Lincoln only, which formed part of the immense possessions belonging to Gilbert de Gaunt, who accompanied the conqueror from Normandy, and afterwards it was granted, in the reign of Edward I. to Henry de Bellamonte, or Beaumont, who it is supposed erected the castle, which having been defended for King Charles I. was destroyed by Cromwell. In this vicinity are the remains of the monastery of Sempringham, remarkable for having been the first double house in England, for the singular and ridiculous order of rebuilding that comprised both monks and nuns under the same roof, called, from their founder, Gilbertines. Gough's Camden's Britannia, and Beauties of England and Wales.

FOLK-LAND, a term which in the ancient Saxon columns signified "cyphæbold lands." And in opposition to these, charter lands were denominated "book or bot lands." FOLKMOTE, FOLCMOTE, or FOLKSMOTE, among our Saxon ancestors, signified any popular or public meeting of all the folk or people of a place, district, or the like; e.g. of all the tenants at a court-leet, or court-baron; or of all the freemen of the county; or of all the barons of a kingdom.

The word, says Stowe, is still in use among the Londoners, and signifies "celebrum ex omni civitate conventum," an assembly of all the citizens. Manwood says, it is the court held in London, wherein all the folk and people of the city did complain of the mayor and Aldermen for any misgovernment. Somner, in his Saxon dictionary, makes folkcomte to denote a general assembly of the people, for doing fealty to the king, and considering and ordering matters of the common-wealth; whence some date the origin of parliaments.

"Oxime

When such assembly is made in a city it may be called a largsmot; when in the country, a largsmote.

"Cum aliquid vero inopinatum & malum contra regnum vel contra coronam regniemerit, ilium debent, pulfratis campanis, quod Anglice vocatur molothel, convocare omnes et univerfós, quod Anglice vocant folkomote, &c." Leg. Alfred.

FOLKSTONE, in Geography, a town of England, in the county of Kent, situated in the English channel, and a member of the Cinque port of Dover, irregularly built along the cliff, nearly opposite to Boulogne. It was formerly a large town, containing five parish churches (now only one); but the greater part of it has been carried off by the sea. There was an ancient flation on Cape-hill, which is a small oval of about two acres, double-ditched on the east, and triple on the north and west. Some vestiges of walls remain, and Roman bricks have been found.

This town is a corporation, governed by a mayor, 12 jurats, and 24 commoners. It is populous, and contained, in 1801, 3257 inhabitants, who chiefly subsist by fishing, and employ a great number of smacks in this trade. Before the town there is good anchorage in 8 or 10 fathoms water. Two holes fail alternately every other week to London, when wind and weather permit. It is distant seven miles S.W. from Dover, and 72 E.S.E. from London, N.lat. 51° 5' E.long. 1° 10'. "To the westward of the town is a bracken-cake, built by Henry VIII.

FOLLICULUS, in Botany, a kind of percarp or food-veil, consisting of one valve and one cell, budding longitudinally, and bearing the seeds on or near its edges, or on a receptacle parallel therewith. Its subitanea is usually conicous and tough, in some instances approaching to woody. Examples of this sort of fruit are found in the Peony, Periwinkle, Sterculia, and some others. Linnæus esteemed the follicle distinct from a capsule, but Gertner, more properly perhaps, comprehends it under his idea of the latter. (See Capsule.) The capsules of Helichorum, Diphinium, Aconitum, &c. come very near the idea of a follicle, except that they appear to be formed of two valves, but this is rather in appearance than reality, and if true, would, on the other hand, bring them to the definition of a ligure; but the latter is always folitary, which the said capsules are not, except in the anomalous instances of some species of Diphinium, in which their true nature is nevertheless evident from analogy.

FOLLICULUS, in Anatomy, a name sometimes given to small glandular bodies; it means a little bag. The parts described under this name have an opening in their centre, through which the secreted fluid is discharged. They are frequently termed mucous follicles, as they generally produce a mucous secretion.

FOLLINUS, HERMAN, in Biography, was born at Friou, and during several years was physicman to the chief magistrate of Bois-le-Duc, until he was elected professor of medicine at Cologne, where he was equally distinguished as a public teacher and as a practical physician. He died of the plague near the middle of the seventeenth century, and left some works of repute. The titles of these are, 1. "De Lucae pelliferie flag. deque remedios ejusdem, libri duo, &c." Antwerpse, 1618, 8vo. 2. "Orationes duæ; de natura et curatione Febris peticularis; de studis chymicis conjunctis cum Hippocratis," Cobuz, 1622, 8vo. His son John, born at Bois-le-Duc, was also distinguished by his practice and his writings.

FOLLIVUS, CAELIVUS, was born at Modena in 1615, after the death of his father, and was educated at Venice, under the care of his uncle, who held a distinguished station among the physicians of the council of health. His medical education was completed at Padua, where he received the degree of doctor in physic. He returned to Venice, where his talents were rewarded by the senate with the honour of knighthood, and an appointment to the fellowship of anatomy, which he long held. He published the following works. 1. "Sanguinis a dextro in sinistram cordis ventriculum definentis, facultas reperta via," Venetis, 1639, 4to. He erroneously supposed that a communication between the cavities of the heart fulfilled through life, by means of little collateral apertures which supplied the place of the foramen ovale, as soon as it was closed after birth. 2. "De generatione et usu della pinguëdine," Venetit, 1644. 4to. 3. "Novo auris internæ delineatio," Venetis, 1645. 1647. 4to. This little work of six pages is esteemed on account of the accuracy of the figures.

Another author, Francis Follis, published a work at Florence in 1665, under the title of "Recreatio Physica, in qua de sanguinis et omnium viventium analogia circulatione difficilior,", 8vo.

FOLLIVERS, in Rural Economy, is a term employed to signify such bees or hive cattle and sheep as follow the fattening bullocks or other live fock in the pastures or other grass lands. It is only in this way that such lands can be fed down in the most effectual manner, and with the greatest profit to the grazing farmer.

FOLLOWFIELD, in Geography, a township of America, in Washington county, Pennsylvania; containing 1639 inhabitants.—Arch. E. and W. Followfield, are two townships in Chester county, Pennsylvania, the former having 1622, and the latter 839 inhabitants.

FOLLY, according to Mr. Locke, consists in the drawing of false conclusions from just principles; by which it is distinguished from madness, which draws just conclusions from false principles.

But this seems too confused a definition; folly, in its most general acceptance, denoting a weakness of intellect or apprehension, or some partial absurdity in sentiment or conduct.

FOLPAGO, in Geography, a town of Italy, in the Trevisan; six miles N.W. of Trionvigio.

FOLSIGE, a town of Africa, in the country of Barea; 18 miles S. E. of Derna.

FOMAHANT, or FOMAHUT, in Astronomy, a star of the first magnitude, in the constellation Aquarius.

FOMANO, in Geography, a river of Naples, which runs into the Adriatic, N.lat. 42° 40'; E.long. 14° 5'.

FOMATION, a liquid medicament, applied to any diseased part, to relieve, diffuse, soften, affage, fortify, or console the same.

Fomations are either simple or compound.

Fomations, Compound, are decoctions of roots, leaves, flowers, and seeds, made in common water, or other proper liquor, to which are sometimes added salts, astringent, oils, &c.

To use, or apply them, they dip a hot linen cloth, or flannel, in the liquor, and spread it on the part affected. These are also fomations made another way, viz., by boiling...
boiling certain drugs in linen bags, and then applying them, bags and all, on the part.

There is also a sort of dry fomentations, being bags filled with medicines, but not boiled, only sometimes sprinkled with a little wine or brandy.

Fomentations, Simple, are those made with Luke-warm water, milk, oil, oxycerate, or the like liquors.

Fomentations are also called local barks, or partial batbings; because, being applied on a diseased part, they have much the same effect as a bath, or half-bath, has on the whole body.

Fomentations have different names, according to the preparations of which they consist, and the uses to which they are applied. Thus, the medicime, fomentation, used for relieving acute pain, is composed of white poppy-heads, with cinchona flowers; half an ounce; which are boiled in three parts of wine to one part of water; or until one part is evaporated, and then the liquor is strained out: the aromatic fomentation is prepared by boiling half an ounce of Jamaica pepper, in a pint of red wine for a little while, and straining out the liquor: this is used both for external and internal complaints. Culcis and disorders of the bowels are often abated by fomenting the abdomen and region of the flank with this warm liquor. The common fomentation is made by slightly boiling the dried tops of wormwood and camomile flowers, of each two ounces, in two quarts of water, and pouring off the liquor; to which may be added such quantities of brandy or spirit of wine as the particular case may require. The emollient fomentation consists of one ounce of camomile flowers; elder flowers, and sweet-fennel seeds, of each half an ounce; boiled for a little while in two quarts of water, and strained, with the addition of spirit of wine, &c.

The strengthening fomentation is prepared of oak bark, one ounce; granite-pellet, half an ounce; alum, two drams; and smith's forge-water, three pints; the water and half tan ounce is boiled; and then the half tallow third is confumed, and in the remaining decotion, Braided, the alum is to be dissolved. This astringent liquor may be applied to foment weak parts, and also used internally.

Fomentations, in Veterinary Science, are commonly made by boiling wormwood, foonerherm, camomile flowers, and bay-leaves in water, so as to make a strong decoction, which, being strained off, are to be applied as hot as possible, without giving pain to the animal, by means of large flannel cloths. The efficacy of fomentations depends in great measure on their use; being continued for a considerable time, and their being frequently repeated.

FOM- HOAM-TOUKA, in Geography, a town of Chiinc; Tartary, near a mountain of the same name; seven miles N. W. of Tab-fan.

FOMHIO, a town of Italy, in the department of the Ada; 15 miles S. E. of Lodhi.

FOM-UL-SICH, a town of the Arabian Irak, on the Tigris; 20 miles N. of Vait.

FON-AMI, a town of Japan, in the island of Xinto; eight miles S. of Taifero.

FONCEAU, in the Marage, is the bottom or end of a cannon-bltt mouth; that is, the part of the bitthat joins it to the banquet. See BITE and CHAPRON.

FONQUEVILLERS, in Geography, a town of France, in the department of the Brains of Calais; 12 miles W. of Bapaume.

FOND DE L'ISLES DE VACH, a town of the island of Hispaniola; 80 miles W. of Jaquemel.

FOND DES NERES a town on the S. coast of Hispaniola; 40 miles W. of Jaquemel.
nicht begin to find that Gluck, Piccini, and Sacchini, could produce good music without the assistance of his basso fondamentale; his system has as pretent but few effectors.

Such is the history of this famous system of the fundamental base.

See Bass Fondamentale, in which article we have explained a curious discovery of natural philosophy, and the life that has been made of it in practical harmony. Though M. Rameau's system will not alone enable a student to compose good music, it will help to facilitate his studies, give him the etymology of chords, and of innumerable passages in melody, and regulate his harmony on a sure foundation. And though it would be dull music indeed that had no other base than the fundamental, as the harmony and modulation of no music is so simple as to be wholly confined to common chords; the fundamental base will therefore teach their warrantable succession, perhaps suggest a melody, or at least guide its progress.

Nothing more seems necessary to be said on this subject; but in looking into the Encyclopædia Methodica, we find that it has furnished matter for an article of such enormous length, as to occupy 3740 pages, 26 of which have been scientifically filled by M. d'Alembert himself, with an elaborate attempt at confuting all that has been said by previous writers on the subject. We have heretofore frankly confessed, that after frequent perusals and confutations of Rameau's theoretical works, and a long acquaintance with the writings of his learned commentator, d'Alembert, and panegyrists the Abbé Rouffier, M. de la Borde, &c., if any one were to ask us to point out what was the discovery or invention upon which his system was founded, we should find it a difficult task.

The base to a common chord has been known ever since the first attempts at counterpoint; and it only seems as if Rameau had given new names to old and well-known combinations, when he calls the key-note, with a, generateur, basso-fondamentale. But the Italians, ever since the time of Zarlino, have distinguished this lowest found by calling it the first base, i.e., basso, and the other parts of the chord, when made the base, basso ricodato, or sib. basso. But Broadwood in his Musical Dictionary, published 1792, in defining Trias harmonica, or the three sounds of a common chord in its first state, calls the under-note basso, or fundamentale; and afterwards remarks that among the three founds that compose the Triade harmonique, the gravell is called basso, or fondamentialis. And what has Rameau told us more, except that the harmoniques produced by a string or pipe, which he does not pretend to have first discovered, are precisely the third and fifth in question. This is the practical principle of the fundamental base; the theoretic was surely known, of harmonical, arithmetical, and geometrical proportion and ratios of sound, with which so many books have been sententiously filled ever since the time of Boethius.

The Abbé Rouffier, his most learned apologist and able champion, candidly confessed in his last work, that the system of a fundamental base ought not to be regarded as one of those principles which precedes the consequences to be deduced from it. "Le mérite de cette découverte consisterait à avoir réduit en un système simple, commode, et facile à faire, toutes les opérations des grands maîtres de l'harmonie. " Traite des Accords, 1764.

Rameau's system, as composed and arranged by d'Alembert, is perhaps the shortest, clearest, and best digested, that is extant; and yet, from the geometric precision with which it has been drawn up by that able mathematician, many explanatory notes and examples are wanting to render Rameau's doctrine intelligible to musical students, in the first stages of their application; and even after that, the work, to be rendered a complete theory, would require many additions of late discoveries and improvements, both in the theory and practice of harmony.

About the year 1760, the System of a Fundamental Base, by Rameau, gave occasion to much discussion in Germany. For some it was adopted there as well as in Italy, by others disputed. It seems, however, as if this system, ingenious as it is, was somewhat over-rated by French theorists, who would persuade the world that all music not computed on Rameau's principles should be thrown into the flames—"Jufqu'à un fondamenta:," says Rameau himself; and M. de la Borde says, that "Music, since the revival of arts, was abandoned to the ear, caprice, and conjecture of composers, and was equally in want of unerring rules in theory and practice—Rameau appeared, and chaos was no more. He was at once Descartes and Newton, having been of as much use to music as both those great men to philosophy." But were Corelli, Geminius, Handel, Bach, the Scarlattis, Leo, Caldara, Durante, and others, etc., such incorrect harmonists as to merit annihilation, because they never heard of Rameau or his system? Indeed, it may be further asked, what good music has been composed, even in France, in consequence of Rameau giving a new name to the base of a common chord, or chord of the seventh? The Italians still call the lowest found of music in parts the basso, whether fundamental or derivative; but do the French imagine that the great composers above-mentioned, and the little composers who need not be mentioned, were ignorant whence every supposed base was derived? The great harmonists of the sixteenth century seldom used any other than fundamental bases. And the fundamental base to the hexachords has always been the key-note, and the fifth above and fifth below, just as Rameau has given it in his theoretic tracts.

The rules, however, which Rameau has given, with d'Alembert's commentary, were tolerably clear for composing according to his system; but are now "explained till all men doubt them!" and the editor of the long article, or rather treatise on the subject, seems only to have puzzled the cause. The definitions and nice distinctions in this article appear to us more ingenious and futile than useful, at least in practice. The nature of our harmony, like the nature of man, is so imperfect, that all the calculation and reasoning which enable us to discover their imperfections, can never supply us with the means of cure.

If by labor and labour we can somewhat diminish these imperfections, and approximate that perfection at which we aspire, it is all that our nature and the nature of things will allow. We can only counterfeit perfection, as a painter or sculptor can counterfeit a man. On our keyed instruments we have but one key or mode perfectly in tune; and on wind instruments not even that. Temperament and deviation from the laws of nature, which our modulation and mixture of keys require, give our musical organ pleasures, as it accommodates itself to the sight heuristics and
imperfections in our intervals and scales. Many think the
character and beauty of keys depend on these false in-
tervals in the C8 temperament. We shall not here give our readers all the prob-ems to
solve, or metaphysics to study, on the fundamental base,
with which the New Encyclopaedia abound; but where it is
said, p. 150, that the fundamental base produces the dia-
tonic genus only as long as it confines its movements to the
octaves, 5ths, and 4ths; when it moves by 3ds it gives the
chromatic genus; and the enharmonic genus when it moves
diatonically to the two first affirmations we can readily
subscribe, but deny the last. A fundamental base, moving
diatonically, would only produce major 15ths to all the
founds; that is, the notes in the flop of the organ called the
ricer, moving in the key of E major, while the base moves
in C. See Plate VI. Music, N. II.

It is very perplexing to young contrapuntists to find
theory and practice so frequently at strife; they are told that
though the fundamental base may ride diatonically, that is,
two bases, carrying common chords by contrary motion,
it never must defend. The student, however, if he has
read nothing until recollect that in Corelli's XIIth folio called "La Pollica," on Parnell's ground, or bet-
ter known by the first line of a song written to the melody,
"All joy to great Cesar," bar the 4th, the modulation
is from D minor to C major; and the effect, which at first
surprizes, from being so uncommon, is pleasing. In the
second bar of Pergolesli's "Stabat Mater," the fundamental
base moves diatonically, from F to E. How is a tiro
to reconcile these contradictions? Nature gives harmonics to
every found, which are never heard but from very low and
very flow notes, and are we never to have a moving base,
or an elegant passage in melody, because every found has
latent harmonics, which, though we cannot hear, (any more
than with the naked eye we can see the satellites of Jupiter),
who but the utterly ignorant doubt of their existence! Let
us never forget that practical music is wholly a work of
art. We are very proud to find that there subsists in nature
any thing on which to build our theory. It is true that with
great difficulty we can discover from the resonance of a
single string, or single bell, the founds of a common
rife in the following fives and octaves; the principal found, 5th to the 8th, and major 3d to the 15th or double octave,
as trebles to the fundamental found. But there are mere
indications, of which none but cultivated, curious, and
nice ears, can ever be convinced. The system built on these
phenomena is very defective; it extends our ideas of nature,
but contracts those of art. Whatever melody or harmony
has been found, or may be found, that is grateful and pleasing
to the ear, may surely be admitted in practice, though
not consonant to mathematical demonstration, or the spec-
ulations of mere theorists. The philosopher, Euler, says
that time, in music, is a silent arithmetic; and we may add,
that harmonic intervals are an auricular geometry; but mea-
ured by a strong hand and good ear.

M. l'Abbe Feytou, who has furnished so many scientific
articles in music to the Encyclopaedia Methodique, thinks
so differently from all other writers on musical articles
which he treats, that his readers have every thing to learn,
which they knew toklomely well before. He neither gives
the students nor their masters credit for knowledge of
any kind. And when in the new edition of the Encyclo-
pedia, he takes up an article after the editors who have
preceded him, it is not to explain more clearly what they
have advanced, but totally to overthrow their reasoning,
and neutralize their precepts and opinions. He seeks to speak
like the first inventor of every thing pertaining to the
musical science. Of practical music he knows but little,
and seems to feel less.

He seeks, in speaking of the fundamental base of Ras-
mean, and the third found of Tartini (see Tertia Suana),
by saying, that "noir inventors were ignorant of the na-
ture, the product, and movements of the founding bodies
or fundamental founds; they did not know the law of pre-
paring, resolving, synthesisions, &c.; nor the principle of
measure, nor that of the pause at an harmonic phrase, nor
the character of a mode or key in general, nor the dif-
tinction of different keys, nor the origin of chords, nor
the formation of different parts, nor the difference between a
continued and fundamental base; and that they have sub-
fitted, without necessity, numbrels' abstrack relations to
those experiments which the vibrations of the founding
body offered to their investigation." And yet these were
the greatest composers of their time in France and Italy :
the one for the organ, and the other for the violin.

The Abbe F. gives some amusing experiments in har-
monies in confirmation of Galileo's discovery, who is, how-
ever, never mentioned in a French book on the subject of
music, except by Merfennius. The experiments given by
the Abbe are ingenious and curious illustrations of Nature's
propensity to give a perfect chord to every single found, but
in composing music for imperfect instruments, till bet-
ter are invented, we must content ourselves with such an
approximation to perfect harmony as we can acquire by
tuning and perfect execution; the rest, we fear, is imprac-
ticable.

The Abbe shows the imperfection of our intervals and keys,
when every fixed found in the course of modulation
must necessarily serve for two or three purposes. This
had been very clearly and ingenuously done in our own country
twenty years ago, in a tract called "An Effay on Tune."
The diacafe has been long discovered; but where, with our
present instruments, is the cure? See Harmonics.

Still disputing the principles of Ramcan and Tartini,
M. Feytou clearly shows what had been long known by
speculative musicians before, that we have no true base to
the scale or octave of C: but this accounts for the Italians
fingering in their solfeggio only the hexachords of each key.
(See Solfeggio and Hexachord.) Of the two
tetrahords in C, whether we suppose the frift in F, as the
Abbe has done, or in C, as in practice, there must be
two fundamental bases riding diatonically, as

C D E F | G A B C | or C D E F | G A B C
F D G C | C D G C | or C D G C | C A F C | C F G C

But as there is no necessity for these fundamental bases
in practice, which can be avoided by innumerable expe-
dients, why regard them as such evils? In fact, the octave,
as the Abbe observes of the key of C, has three genera-
tors, or fundamental bases, F C G, or C F G. It is
only the violin and its kindred that can give every found
its true intonation in all keys; as D B and C B, D G and E B,
&c.

We are obliged to mitigate these wants by temperament,
which makes all keys imperfect to a certain degree; though
the suffering is not great, when the music and execution
are perfect. And, till new instruments are invented, what
can we do? Must we burn the old, drive music from the
company of the fine arts, nor longer allow her to rank in
the circle of the sciences till perfectibility in all instrumen-
ts is attained? which will probably be when that perfectibility
of man is acquired that shall exempt him from all the infini-
ties which flesh is heir to, and enable him, "unless he chuse it,
to escape death itself.

M. l'Abbe
M. l'Abbe deduces every thing of importance in practical music from the fundamental base. Not only the most perfect chord in harmony, the most pleasing notes in melody, but choirs, measures, genera, progression and modulation of discords, keys, and modulation. The only thing in which he allows Rameau to be right in explaining his own system, is the terming the fundamental base the magnet, compass, sovereign guide of the ear.

The making the F. B. the regulatrix of time in music is new and fanciful; but, we fear, visionary and impracticable in the unbridled range of modern music, which is to defultory, wild, and often capricious, comic, and whimsical, as well as solemn and pathetic, that if regulated in its measures and phrasing by any new restraint, there would be an outcry against the invasion of a musician's rights, and "la liberté de la musique," a subject which M. d'Alembert has treated with great gravity. See d'Alembert.

Besides the experiments in harmonics, we have musical problems, which manifest much ingenuity and meditation. In speaking of the genera, the learned Abbé was naturally led to the subject of Greek music. He regards the notes of the hypaton, or lowest tetrachord, C D E, as the original four strings of the Mercurian lyre; and gives Ptolemy's ratios of those sounds. He has nothing new on this subject, except that it is not a subject of disputes. He therefore gives the ratios of the three genera from the Greek writers in Mesobions, which others have often done before. But that the fundamental base may have a share in the honour of Greek inventions, he informs us that the scale of the conjoint tetrachord in the diatonic genus is derived from the F. B. of two keys, C and F, and the modern octave scale from three. (See Tetrachords and Scale.) But we have long observed, that there is no ascending more than three notes gradually without a change of key. Notwithstanding the extreme length and labour of this article in the Encyclopaedia, M. the Abbé F. has left many of its constituent parts where he found them, with respect to practice: such as the scale, cadences, measure, modulation, eu- or harmonic, &c. (which see under their several heads.) He neither allows Rameau nor Tartini to know the gamut; he disputes with them the intervals of the f c k, and the base to those intervals. Indeed nothing has ever been advanced by a musical writer, that has fallen in his way, of which he does not set fire to the refutation. To have a new gamut to learn, new techniques, and to accustom the ear to new sounds, is a talk to which great musicians will not submit, and the little ones will follow them, not the advice of speculative theorists, which indeed they are not likely to read.

We cannot help supposing that the ears of modern musicians are as well organized by nature, and as highly polished by art, as those of the ancients; and that the present gamut, and laws of harmony, are as perfect and refined as the present construction of our instruments will allow: and if ever better should be invented, that they will soon be universally adopted, piano forte being preferred now to harpsichords, as harpsichords were to spinets, and spinets to virginals. But till the improvement and refinements in our scales, intervals, and confonances are rendered practicable by new instruments or corrections of the old, music will not be bettered by these speculations, though they may point out ineradicable evils to the ignorant, and make them more unwilling to be pleased than before they were told of them; and which they never could have found out or suspected. And after the bold assertions concerning the ignorance of two men of such great professional abilities as Rameau and Tartini, we had a right to expect the abbé Feyton's rules to be illustrated by examples of composition on his own principles, or at least rendered to evident, that all musicians, and the artistic ear would be benefited by them; but alas! latterly shaking the student's faith in the rules which long guided him to the means of delighting the musical world by what were then thought admirable productions: it appears according to the learned Abbé, that we are all in the wrong, to be pleased; for all the music hitherto composed has proceeded from false principles: neither the form, melody, nor harmony, with which we have been delighted, was genuine and pure; concords nor discords properly treated, accents rightly placed, nor measure correct. The true distinctions, refinements, and scientific paradox, with which they are laid down, give them an imposing appearance; but when examined, and we consider what has been done, and is still being done without them, and that nothing has yet been achieved with them; that many are unintelligible, and others impracticable; it seems as if we had better cease to try in explaining, the old established rules upon which Corelli, Handel, Vinc, Perotto, Jomelli, Piccioli, Sacchini, the Bachs, Hayes, and Mozart, have been formed; nor are we sure of the effect, can we conscientiously recommend young subjects to be inculcated by matter taken from this learned and elaborated article.

Fondamentalis, Souris, Lat. is the principal foundation of the harmonic triad. Walther.

Fondaments, Ital.; Fondament, French; Fondamentum, Lat. is the lowest and most important note in the harmony of the common chord, the ground or foundation upon which the chords in thorough base are built. Walther. See Basse Fondamentale.

Fonde, Isles de, in Geography, three small islands in the Southern Indian ocean, near the S. coast of Kerguelen's land. S. lat. 29° 31'. E. long. 16° 39'.

Fonderoy, a town of Annapolis, in Virginia, situated on the Rappahanock river, ten miles S.E. of Leeds. N. lat. 38° 2'. W. long. 76° 34'.

Fondu, a town of Naples, in Lavora, near a lake to which it gives name; the site of a bishopric of Cagnone. This was anciently a municipal town, and afterwards a prefecture; which stood on the Appian way. At the extremity of the town is a castle, of no great strength. It was erected by Ferdinand, king of Naples, into a dukedom, in favour of Prosper Colonna. In 1534, Barbarossa, the famous corsair, wishing to seize the beautiful Julia of Gonzaga, widow of the fon of Colonna, for the purpose of carrying her off, and presenting her to the Grand Signor, but disapponted by her escape, took vengeance on the town, which, as well as the inhabitants, he treated with the utmost barbarity. The story of the havoc, which he committed, is painted in the church of the Annunciation. Fondo is situated on a plain, surrounded on one side with hills, having the appearance of an amphitheatre; most of these hills are covered with olive-trees, and the whole plain is interpenetrated with orange, lemon, and other fruit-trees; the verdure of which forms a perpetual spring; 56 miles E. of Rome. N. lat. 41° 25'. E. long. 13° 50'.

Fondo, or Sceneto Fondo, a small island in the gulf of Venice, near the coast of Iliria. N. lat. 45° 14'. E. long. 13° 44'.

Fong, the name of several towns of China; one in Quang-tong; another in Hon-quang; and a third in Kwang-nan.

Fong-chan, a town in the island of Formosa; 25 miles S. of Tay-souan.
FONG-CHANG, a town of Corea; 11 miles S. of Hoang-tehcoou.

FONG-HOA, a town of China, in the province of Tchao-kiang; 11 miles S.S.W. of Ning-po.

FONG-HOA-TCHING, a large and commercial town of Chinde Tartary, in the province of Chen-yang, on the borders of Corea; the chief manufacture is paper of cotton, which is white and transparent, and used for windows instead of glass. N. lat. 40° 31'. E. long. 123° 42'.

The adjacent country contains many mountains, some of which abound with metals and wood fit for building; the land is in general fertile, and produces wheat, milt, leguminous plants, and cotton. Immense herds of oxen, and flocks of sheep feed in the valleys. The inhabitants grow little rice; but fruit-trees of almost every kind are found here.

FONG-KIEOU, a town of China, of the third rank, in Honan.

FONG-SIN, a town of China, of the third rank, in Kiang-nan.

FONG-TCHING, a town of Corea; 117 miles W.S.W. of Hoang-tehcoou.—Also, a town of China, of the third rank, in Quang-tong.

FONG-TEN, a town of Corea; 24 miles N.N.W. of King-kistao.

FONG-TSIANG, a city of China, of the first rank, in Chuan-fu. N. lat. 34° 36'. E. long. 107'.

FONG-YANG, a city of China, of the first rank, in the province of Kiang-nan; situated on a mountain, which hangs over the Yellow river, and inclining within its walls several fertile little hills. Its jurisdiction is extensive; comprehending 18 cities. This was the birth-place of the emperor Hong-vou, who formed a design of rendering it a famous and magnificent city, as the seat of empire. After having expelled the Western Tartars, who had taken possession of China, he transferred his court hither, and named the city Fong-yang, i.e. the place of the eagle's splendour. But several objections occurring in the further view of the situation, he abandoned his design, and established his court at Nan-king. Of his design three monuments were executed, which, now remaining, sufficiently show how magnificent the city would have been, if the emperor's plan had been completed. The first of these monuments is the tomb of the father of Hong-vou, called "Hoang-lin," or the Royal tomb. The second is a tower built in the middle of the city, of an oblong form, 100 feet high, and said to be the most lofty in China. The third is a magnificent temple erected to the god Fo. This was at first a pagoda, to which Hong-vou entered when he had left his parents, and where he found an asylum in his distress; but after he had been elevated to the throne, in consequence of a succession of vicissitudes, he caused this temple to be constructed, in testimony of his gratitude to the Bonzes; assigning them a revenue sufficient for 300 persons, under a chief of their own sect, whom he constituted a mandarin. At present here are only about 20 priests, who being neglected are almost reduced to beggary.

FONGA, a town of Japan, on the island of Niphon; 55 miles S.E. of Meaco.

FONIA, a kingdom of Africa, on the borders of the river Gambia, near the sea.

FON JUN, a town of China, of the third rank, in Pesceli.

FONS PULSATILIS, in Anatomy, a name given to the ventricle, in consequence of the pulsation felt there, which arises from the influx of blood into the arteries of the brain.

FON, in Geography, a town of France, in the department of the Lot; 12 miles S. of St. Cere. N. lat. 44° 40'. E. long. 2° 20'.

FON, Cape, a cape on the S. coast of Minorca. N. lat. 39° 30'. E. long. 4° 10'.

FONSECA DAY. See AMAPALLA.

FONSECA, Peter de, in Biography, a learned Jesuit, was born about the year 1528. He entered the society at the age of twenty, and became distinguished by his talents, learning, and address. He was the first who was appointed professor of philosophy in the university of Coimbra; afterwards he undertook the professorship of theology in the university of Evora, where he was admitted to the degree of doctor, in the year 1570. From this period he filled, with high reputation, several very considerable posts belonging to his order. He was also in high favour with Philip II. king of Spain and Portugal, and with pope Gregory XIII.; by both of whom he was employed in different important negotiations. He died at Lisbon, in the year 1599, at the age of 71. He was author of many publications, chiefly philosophical, which have been printed in three volumes, folio. Moretti.

FONSECA, Gabriel de, was born at Lamengo, in Portugal, and became a public teacher of philosophy at Pisa, and of medicine at Rome, where he was appointed physician to Inoence X. He survived that pope, and died in 1668, under the pontificate of Clement IX. He left some writings under the titles of "Economia Medici;" "Consultationes;" "Convivix Medicinalia." It is believed that he was the author of some of the works, which bibliographers have attributed to his cousin Roderic.

FONSECA, Roderic de, was a native of Lisbon, and the reputation which he had obtained in that city, by the practice of his profession, induced the university of Pisa to invite him to the chair of professor of medicine. He accepted the invitation, and filled the office with considerable distinction for a number of years; but at length relinquished it, in 1615, in order to become the principal of the faculty of Padua; an office which he adorned by his talents until the period of his death, in 1622. The following are the titles of the numerous works which are attributed to him:


FON SOMME, in Geography, a town of France, in the department of the Aisne, near the source of the Somme; 5 miles N.E. of St. Quentin.

FON SSAY, a town of France, in the department of the Vendée; 6 miles N.E. of Fontenay-le Comte.

FON, in Ecclesiastical History, is now applied to designate
F O N T.

The term font was early adopted among the fathers of the primitive church. It was originally applied to the lake, river, or stream, where persons, in the dawn of Christianity, received initiation into the congregation of Christ, by the ceremony of immersion. At the period it was a matter of doubt, and of difficult determination, whether a person was baptized in the sea, or a lake, in fluctuant or running water; and the validity of the ordinance was alike acknowledged in those who had received it at the hands of St. Peter in the Tiber, and in Jordan by St. John. As the gospel was extended, and the number of converts increased, this practice, from local circumstances, must in a variety of influences cease; and an artificial fountain, or basin of water, was adopted in place of the natural stream. During the first period of the church, and while Christians laboured under the disadvantages of persecution, the font-van could be performed in no fixed place; but when once established, and places of public worship erected and sanctioned by law, it is reasonable to suppose that some proper place would be chosen, and an appropriate structure built for the performance of the baptismal rites. This was a principal building among those that were termed the public buildings of the early churches. Enaeus, describing the church of Paulinus at Tyre, says, that when that curious artific had imitated his famous structure, and completed the internal decorations, he then commenced the exedra, or buildings annexed to the church, and which, he observed, were chiefly for the use of such persons as needed purgation by ablation of water, and the Holy Ghost, viz., the baptistery. Hence it is evident, contrary to the opinion of Dr. Beveridge, and other learned writers, this building was a distinct place from the church; and that the font, or lavatory, was not originally placed in the narthex, or western part of the church, as at present; but in a place peculiarly appropriated for its reception. This opinion is supported by positive evidence. Paulinus, bishop of Nola, displaying the great munificence of his friend Severus, observes, that he erected two churches, and a baptistery between them. And Cyril, bishop of Jerusalem, in describing one, represents it as a separate building, which had first its sepulchrum, or porch or ante-room, where the catechumens or novitiates delivered their renunciation of Satan, and confession of faith; and its atrium, or inner apartment, where the sacrament of baptism was performed. Sidonius Apollinaris also speaks of it as a separate building; and St. Augustin intimates that there were distinct apartments for the accommodation of male and female converts. Thefe baptisteries were anciently very capacious, because, as Dr. Cave justly observes, the slanted times of baptism but seldom occurring, immense multitudes usually attended at the appointed season; and the manner of baptizing by immersion, and many of the subjects adults, rendered it requisite to have a very large re-voir or font for water. Accordingly Venantius Fortunatus fyles the baptistery "sua baptismatis," the grand hall of baptism. So capacious indeed were some of them, that it is reported councils have held their fittings in such structures; as Du Prene clearly evinces from the acts of the council which sat at Chalcedon. Suicerius also mentions, that in the acts of the council of Carthage, a recapitulation is made of tractsions which occurred in one, held in the baptistery of Constantinople. Thence answered the purposes of schools also, where the catechumens received instruction previous to their being baptized; and from this circumstance, and the consequent illumination derived from the sacrament, the baptistery also obtained the appellation of ostium, or place of divine illumination. The distinction, then, between the baptistery and the font is now apparent: the one comprehending the whole building, dressing rooms, and other apartments; and the other, the receptacle for the water used in the solemn rite. The latter, in Greek writers, is usually denominated ὑποδοχή τοῦ ἔριος, in the Latin piscina, and is frequently distinguished from the baptistery, and spoken of as a separate place. For Socrates expressly styles font the baptismal pool. The Greek name, Dr. Beveridge supposes, was given to the font in allusion to the fishful reservoir of Bethel; and Opstius furnishes a more mythical reason for the Latin appellation. He observes it was called piscina, in allusion to our Saviour's name, more technically, Πισιν, an acrostyle composed of the initial letters of his several titles, Jesus Chrifti, the Son of God, our Saviour. But these are remarks unworthy of criticism, and derogatory to the dignity of antiquarian research. Both terms are common names for fountains, pools, or baths, in Greek and Latin authors. And the font appears to have been originally, in these baptisteries, a kind of bath in a separate room from that where the vestments were deposited, while the ceremony was performed; for Cyril describes the catechumens as being unclothed in an inner apartment, and thence conducted to the larger of regeneration, where, after having made a profession of their faith, they were immerged three times in the water, in allusion to the doctrine of the trinity.

Respecting the form of the ancient baptisteries, little can be collected from early writers. Leo III. who, according to Du Pin, was elected pope A.D. 795, is stated to have erected one, probably agreeable to the ancient model, which is thus described: "Iadem precatum fundamentis ipsum baptisterial in rotundum, ampla largitate continuas in meliorum statum, atque facrum fontem in medio largiori spatio fundavit." What was the form of the font, or of what materials constructed, little satisfaction can be obtained. In a canon of the council at Lerida it is observed, the font should be lapillus, made of stone. What Damasus relates, in the pontifical, of a font made of porphyry marble, richly ornamented with gold and silver imagery, and other elegant decorations, in which the emperor Constantius was baptized, and by him presented to the church of St. Sophia at Constantinople, is a mere fabulous legend, unworthy of the smallest credit.

Thus did the use of baptisteries, as structures distinct from the church, continue till about the sixth century; though Mofheim observes, "baptismal fonts were now, (in the fourth century,) erected in the porch of each church, for the more commodious administration of that initial sacrament." But in this observation he is only borne out by the brief hint of Du Pin, in his remarks on the life and writings of Athanasius. "As to what concerns discipline in his time, one may observe in his works that there were fonts in churches, and that oil, wine, and bread for offerings were kept for the use of the font. Stately, in his History of Churches, observes the first fonts were set up in private houses, and after those professing Christianity had received from perfection, they were placed in more conspicuous situations at a small distance from the church; afterwards they were removed into the church porch; and subsequently into that part of the nave where they usually stand at present. The learned are generally agreed that anciently there was but one baptistery in a city, and that at or near the bishop's church; which usage Durandus informs us was continued down to his time at Pisa, Bologna, Orvieto, Parma, and Florence, in Italy. And the church of St. Jean le Rond at Paris was the place for the general baptistery of that city. In his, which
Font.

were called baptismal churches, baptism was administered during the vigils of Easter and Whitsun-tide, with lighted tapers burning, by the bishop, and the prebendaries by him commissioned for that purpose; and it was only in cases of extreme urgency that a faculty could be obtained for the administration of this sacrament. But at these two solemn fealtions of its administration. In after ages, however, the inconveniences were found so great from this restriction, that baptistries were allowed to be set up in many parochial churches. For in the council of Ancyere, baptizing in villages, by allowance from the ordinary, is formally recognized. This privilege, however, was not granted to every place, but only to those the bishop appointed; and where the necessity of the case seemed to require such extension, whereas the churches at such places obtained the distinction of mother-churches, because the real dependence upon them for receiving the ceremony of regeneration, as they had previously done on the episcopal church. After the establishment of Christianity in Italy, subjects following the example of their sovereigns, almost universally became professing Christians; and as they would early desire the participation of the same faith, adult baptism would seldom be found necessary. For notwithstanding the unsupported allusion of Mr. Robinson in his history, that infant baptism did not become an established custom till the fourteenth century; yet Bingham and Wall have incontrovertibly proved that it was a practice generally prevalent in the latter end of the thirteenth, or beginning of the fourteenth centuries. Indeed the existence of fonts only calculated for the immersion of infants, made so early as the Saxon period of our own annals, would be sufficient to refute the allegation.

On increasing the number of baptismal churches, the general adoption of infant baptism, and the necessity of a capacious bath for the immersion of adults no longer existing; a large basin of stone was substituted for the spacious bath, and the baptistery exchanged for the Lapidian font; which afterwards retained the original appellation.

Respecting fonts in England, they are mentioned by Bede in his Ecclesiastical History, under the name of Lavata: for he mentions King Edward having received the "lavacrum sanctae regenerationis" and other fonts in imitation of those in the year 689, "Rex Cadwalla venit Romam ut ad hinc beatorum apollorum fonte baptismali abluereetur." Though the privilege was early extended to certain parochial churches, yet the erection and use of fonts, in conventual churches, occasioned as strong contentions as the setting up conventional minds under the feudal system. An author in the Gentleman's Magazine, (Mr. Donne) is of opinion, that few cathedrals were ornamented with fixed fonts, at a much earlier period than the date of one set up in the cathedral at Canterbury, in the year 1236; unless in indulges where they had also parochial altars for the use of the lay-people of some contiguous districts; which was the case at Salisbury, and probably also at Winchester and Lincoln. Yet Edmund, archbishop of Canterbury, in the constitutions promulgated by him in the year 1236, directs that a stone font should be provided in every baptismal church; which, according to Lywood, was a church having the city connected with it. "In quibus ecclesiis baptismali, tabulae in tabernis, sine altari, sine pulpitum, sine cathedra, sine confessionales, sunt." In the history of Sherborne monastery, a contention is noticed between the monks and the parishes, in which disfension the former complained, that though there had been from the foundation of the monastery a font in the nave of the conventual church, where the children of the parish had usually been baptized; yet the inhabitants had set up another in that part of the church in which they were accustomed to hear divine service.

Fonts were generally formed of stone, yet some instances occur of their being made of lead; and Staley mentions a small magnificent one of solid brass, that was placed at St. Albans. This, in which the children of the kings of Scotland used to be baptized, had on it an inscription, indicating that it was Richard, Lan, knight, master of the pioneers, took and brought it home among the spoils, and presented it to this church. The general adoption of fonts for the composition of fonts, say Darell, and other Roman ritualists, was, because, as water sufficed out of the rock, as a type of baptism, fo Christ, who is the fountain of living water, is also a rock, and the chief corner stone of the spiritual church.

A description and detail of the architecture, sculpture, and doings, displayed in all the fonts subsisting in this kingdom, would be an interesting work. To attempt to clas them under sylvis at first sight appears impossible. The suite ensemble puts on such a Roman shape, and affumes such a confounding variety, as seemingly to defy all attempt at arrangement. Upon a closer survey, however, they appear to separate, and fall within certain epochs; and though some anomalous cases may occur, and some fanciful inferences may be produced; yet when properly ranged they will be reducible perhaps to three periods, viz. Saxon, Anglo-Norman, and English: no monument of this kind appearing to be distinctly British, as to be referable to that period.

After the conversion of the Saxons to Christianity by the missionary, St. Aulfin, they appear to have had a close connection and intercourse with Rome. And in their ecclesiastical buildings and ornaments they would naturally imitate the practices of the church, from whence they had imbibed their faith; and indeed it is recorded that for a considerable period their architects and other artists were brought from Italy. These would of course imitate such ornaments as they had been accustomed to admire in the magnificent temples, and other structures in that country. Thus some of the most ancient fonts are in their forms evidently taken from vats, urns, votive altars, &c. Some, for instance, are hollowed out of a solid granite, placed upon plain pedestals, and covered with one, two, or more steps; others altar shaped, and ornamented with pilasters.

Under this early, or first, period, may be classed the font at Wimpole in Cambridge-shire, consisting of a simple stone of an hexagonal shape, having a circular cavity in the centre, and placed on a flat square base. The one at Studeley Bucks is a vase, in the shape of a truncated hollow cone, inerently fixed upon two circular steps. Another of dark grey marble, in which, as Camden was informed, princes had been baptized, of a similar shape, is at Preute in Wilts; the columns of which church are clearly approachable to a Saxon era. Rotherfield-Graves, Oxonshire, is of an oblong form, with a circular hollow, and has a pilaster at each angle, and the base and upper part surrounded with ogee moldings. The font in the upper church of Lewes in Sussex is harel-shaped, the convex part ornamented with fretwork, and round the top and bottom runs a frieze, composed of rings and quatrefoils. Nefwick in Yorkshire is a cylinder, ornamented with numerous slender pilasters, surmounted with interlacing arches; and a similar one may be seen at Ancaster, in the county of Lincoln.

Next to these, in point of antiquity, appear to be those of a quadrangular or circular form, placed upon a single central shaft, encompassed with pillars; or having a small column at each
Each angle of the font, which they apparently support as an entablature. Of the first kind is the font at Berkley in Gloucestershire, which has four mullioned round columns with simple capitals, flanking on a plain pedestal, and a scroll moulding round the lower edge of the font. Under this division range the fonts at Buxborough, Herts; Sudbury, Suff.; Roydon, Essex; Hendon, Middlesex; and Albury and Sandridge, Herts. One at Berkley, Oxfordshire, has the columns devoid of base and capital, and ornamented with divers fanciful circulations. Of the second, or circular kind, are those of Hornhead and Oxleworth in Gloucestershire. Other instances occur, where the central shaft is wanting. The one at Bowes, in Yorkshire, is a circular bafin, supported by three columns; one at Wiceldon, Bucks, by two; and the one at Ely, in Yorkshire, is round, and rests on a shaft, formed by a circular arcade. In point of time it is difficult to decide which of these two kinds justly claims precedence. But, The next in antiquity seem to be those decorated with historical or emblematical bas reliefs. At Everingham, in Yorkshire, is a very antique font, ornamented with Saxon carving; and one at Alphinton, in the county of Devon, is charged with interlaced arches and a falcia, comprising the figures of birds, beasts, sportmen, &c. emblematic of hunting. One at Sharnebourn, Norfolk, is still more formal and rude in the designs; and a similar one is in the church of Daven, Kent. The font of Burnham Depeleda, in Norfolk, is deserving of particular notice. The sculpture is so mean, and the figures so rude, as clearly to evidence it to be a work of remote antiquity; and notwithstanding Mr. Pegge has assigned some reasons in the Archæologia for referring both the church and font to a later than the Saxon or Danish periods, yet they are very far from being satisfactory. The pecular, far more antiticated that the body of the church, is one of those round towers supposed to have been erected by the Danes, which give almost an exclusive peculiarity of features to the ecclesiastical structures in the counties of Norfolk and Suffolk. The rudeness of the figures, and the nature of the subject they were meant to represent, militate also against Mr. Pegge's conjecture. The font is of a quadrangular shape, supported by four clustered columns, each composed of three pillars. Of the square form resting upon four pillars, devoid of the central column, the one in Sharnebourn church, in the county of Norfolk, prefers a curious insalience. The body of the font rests upon four mullioned clustered columns, the capitals ornamented with grotesque heads, and a fanciful border extends round the edge of the font. This, though rude, is a rich piece of sculpture. The whole is placed against one of the pillars of the nave, for which position it was originally designed, one of the sides having been left blank. The three others are ornamented with figures in baso relief, representative of agricultural subjects. The compartments are twelve, and the emblems were designed to depict the labours of husbandry through the different months of the year. January represented by a figure seated on a mangel horn in his hand; February, by a figure fitting in a quicke pasturage, emblematical of the inactivity of that month; March, by a husbandman in the act of digging; April, by a man with a pruning-hook in one hand, and a branch in the other; May, by a female figure with growing hair, displaying a basket; June, by an uncouth figure holding a wedding implement; July, by a man mowing; August, by a person gathering and binding corn; September, by a man threshing; October, by a person carrying liquor; November, by a man carrying wood; December, by a group feasting. A font decorated with rude and emblematic sculpture in Fincham church, Norfolk, which was misunderstood by the historian of that county, is by some supposed of equal antiquity. Such were, probably, many of the first fonts in the early days of Christianity among the Saxons, while heathenism was strongly mixed with Christian rites; but as the genius of the gospel was better understood, it would be natural to decorate their temples, and ornament their sacred shrines, with Christian emblems. Such appear the fonts of Lincoln, Winchester and Earl Mean, in Hants. The latter two, which are very similar, are probably as ancient as the time of Battius, the first bishop of Winchester; and the emblems by which they are enriched are supposed allusive to the conversion of the West Saxons from idolatry. An engraving of the former has been given in that splendid work, the "Vetustia Monumenta." The latter is a square block of black marble, having a central excavation, and resting on a shaft, formed of three single stones, with a circular column at each angle of the font, devoid of bases, and capitals composed of foliage. At two of the angles are two doves, represented as putting their beaks into bottles, surmounted by a crofs. Two faces of the square are ornamented with arches, supported by alternate double and single pillars, and the incumbent frieze is charged with various birds and beasts. Of the alternate two are represented, in the rudolf style of relief, on one the creation of man, the conformation of Adam, and Eve taken from his side, and the temptation by the serpent; on the other, their expulsion from paradise by an angel driving them, with an uplifted sword, through the portal of a palace; and the other scene represents Adam with a spade, Eve with a distaff, and an infant placed flanding between them.

The next, in respect of time, are probably such as are ornamented with figures of the apostles, as the one at Kiddington, in Oxfordshire, removed from Ilth, in the same county. This is said to have been the identical font in which Edward the Confessor was baptised. The font at St. Peter's, Oxford, which was charged with figures of the twelve apostles, Hearne erroneously supposed to have been one of the fonts decorated with religious emblems and ornamental bearings. This fashion was probably introduced from Normandy soon after the conquest. The fonts at Eton, Kirkby Belers, and Market Bosworth, in Leicestershire, are of an hexagonal shape, and the bases charged with flaxes of arms. Of a like description Burgh, Great Shephey, and Utford, in Suffolk; St. Olyth, Essex; Maltavers and Winterbourne, Devon; and numerous others in various parts of the kingdom. About the time of Henry III. this mode of introducing heraldic devices, to emblazon the deeds of munificent or pious performed by great families, became extremely prevalent; and was not only made a subject for sculpture, but also of painting, when what was at first in relief and in miniature on fonts or monuments, was transferred on an extended scale to the windows of churches, and gave rise and encouragement to the elegant art of framing glass. To this period are assignable such as are ornamented with armorial bearings, and those also having borders of quatre-fills, initials, &c. supported in divers instances with figures of animalis conchans, rampant, and in other attitudes. To a succeeding period may probably be referred those bearing the symbols of the evangelists, ornaments of the passion, with the shafts supported by figures of the apostles, and other fonts. Of this kind are Filton, in Suffolk; St. Clement's, at Hatfield; and Sittingbourne, in Kent. The font at Lutter, in
in Bedfordshire, is of an octagonal shape, raised upon a flight of octagonal steps. Over it is a canopy supported by eight columns, about twenty-five feet in height, forming a kind of piazza, under which might stand eight people. This may be considered a baptistry on a small scale, and is the only thing of the sort in the kingdom. In the centre of the roof is a lion O., and a griffin V., rampant.

The *post period* comprehends a portion of our history for about two centuries anterior to the reformation; and is the more remarkable, because the change which occurred in the mode of ornamenting fonts is connected with that event, it having been one of the jetic hicks made use of by the freuch abettors of the Romish tenets to support their tottering faith against the tremendous blows it was then receiving from the formidable attacks of Lol-lardin. The controverted doctrine respecting the seven sacraments, powerfully opposed as antiscriptural, must be defended, and every art was had recourse to likely to accom-
plish the desirable measure. Not only were they embodied, but so represented in painting and sculpture. They were depicted on glass in the windows of churches, delineated in stone on the baptismal fonts; and the emblems of actual events and real personages of scripture were superseded by figures representative of the fuperilitions and errors in the Romish

church. No people better understood the mode of working upon the minds of men, and bringing adventitious objects to assist the powers of persuasion, than the priests in general of that communion. The effects produced upon the mind by objects represented strongly to the sight by the fascinating arts of sculpture and painting, they had well studied for centuries, and now had recourse to them for mortifying the doctrine, and fixing the vacillating minds of the multitude on the occasion. Appeals were made to Rome for arts, uages, &c., and no expense was spared to combine elegance of design with exquisiteness of execution. The octagonal form was adopted, not only because it exhibited sufficient sides for the requisite exhibitions, but because it was sanctioned by a custom of high antiquity. It is thus recommended in lines, written by St. Ambrose, placed over the font of St. Tecla, at Milan, in Italy, prior to its having been adorned with modern magnificence.

"Oc[estwororum fanetos templum surrexit in usus, O[cagonus fons oft munere dignus co, Hoc numero decuit facii baptismatis aulam Surgere, quo populis vere falus reddit Luce refurgenti Christi, qui clautra revolvit Mortis a timulis sapient comites."

During the period in question, some most costly structures were erected. The florid Gothic, as it has been termed in architecture, was carried to its height; and the mode of enriching fonts with elegant sculpture, as well as decorating various parts of the building, seemed to keep pace with each other. Numerous fonts erected at that time are objects of laudable curiosity, and worthy of peculiar investigation, as serving to mark the progress and advancement in the art of sculpture, and how much it appears to have derived improvement from the cultivation of the finer art. To point out all, or to describe even a few of those worthy of notice, which fall under this division, would ex-
tend this article too far. A description of one will in high preservation at Waltham abbey church, in the county of Norfolk, unnoticed by writers on this subject, may be ac-
ceptable; as it is, perhaps without exception, the finest and most perfect specimen in the kingdom. The base is an octagon, decorated with rosettes and quatre-foils; the plinth, of the same shape, has in it four steps, the fronts and sides of which are enriched with divers ornaments. The oce-
gonal shaft is decorated with various tabernacle-work, and the pilasters concentrating from niches with crocheted pin-
acles, in which are placed statues of the apostles. The lower border of the font also is decorated with emblematic heads and devices; and the eight sides have the seven fa-
cient forms, and the crucifixion, executed in bold relief. Among other fine specimens of this kind may be briefly enumerated Earl Dereham, Norfolk; Melton, Suffolk; and Grantham, in Lincolnshire. The covers seem generally to have been made to correspond with the work ex-
hibited in the font: the simpler fonts having plainier covers, and vice versa. These generally consisting of wood were of a pyramidal shape, crowned with a crosset pate russe; and in some instances over it was placed the figure of a dove. In some cases the covers were curiously carved, and deco-
rated in the pointed style with rich tabernacle-work. Such is the one at Sudbury in Suffolk, made of oak, variously carved in the pointed style, the sides adorned with the figures of four lambs, as atgni de, over which are the symbols of the evangelists; and between these, angels present-
ing shields charged with different family arms. This is conjectured to be coeval with the time of Richard I. Mr. Vertue distinctly mentions his having seen several fonts in Nor-
folk, which had alludes to the "high pinnacled wooden spires," richly ornamented with elaborate carving.

It may at first seem paradoxical that fonts should have gradually come into disuse, so far as respects the original purpose of them, as vesels for containing the consecrated water, from the time of the Reformation; especially when, among the canons promulgated in 1571, one particularly directs the providing a *font*, and prohibits the substitution of a *bassin*. But the reason will be found in the variety of superfluous connected with the use of fonts previous to the time in question; the effects of which remained long after, and are not even at the present day eradicated from the minds of the common people. In the ancient fonts there was a hole in the bottom of each, provided with a hoppole, for letting out the water, after the ceremony was over; which was conveyed away under ground by means of a pipe, included in the shaft. This was done to prevent a super-
fluous use being made of such consecrated water: poffons frequently taking it to the houses of those afflicted with divers diseases, in order to perform miraculous cures. Two others also are alluded to in one of the before-mentioned canons: "whether any use be had of the font on Easter even? and, whether the water in the font be changed every month?" Upon the abolishing of the liturgy, and the sub-
stituting the directory in its stead, an order was issued by the parliament for the removal of all fonts out of the churches, and to adopt the use of basins in their stead. Many were then sold, turned into horse-troughs, and de-
cremented to other ordinary uses; and though, at the Restora-

tion, many were repurchased, and again set up in the respective churches, yet numbers never were replaced. From the coldness of our climate operating on that timidity of parents, arizing from luxury, which obtained the op-
tional privilege of asperion instead of immersion, and grad-
ually introduced the use of sprinkling altogether in the baptismal ceremony, large fonts became unnecessary, and basins were found much more commodious: so that now, in most of our modern churches and chapels, the vesel for this purpose consists simply of a small marble bowl, placed upon a broader column or flange of the same material; so that, in no distant period, fonts will become, not only reflecting their age, and as specimens of art, but also as to their de-
ignation and use, a subject of curious inquiry and anti-
quanian
acquainted with him, he was highly esteemed. In his character he exhibited the simplicity of a child: he was mild, gentle, timid, credulous, sincere, and void of envy and ambition. He was singularly retent in the concerns of life, and readily submitted himself to the guidance of others. He obtained the appellation of "le bon-homme." In company he was usually silent, and seldom sought in society, unless with a few intimate friends. La Fontaine was not in favour with Lewis XIV., and was almost the only considerate writer who did not partake of that prince's bounty. The king even solicited to confirm his election to a seat in the French academy, and would probably never have given his consent, but to compromise the matter in respect to Boileau, who was elected to please the sovereign, though much against the wishes of the majority of the academy.

After the death of Mme. de la Sablière, with whom he had lived 20 years, La Fontaine was invited to take up his abode in England; but the difficulty which he found in the attempt at acquiring the language made him abandon the design. In the year 1692 he was taken seriously ill: a priest was introduced to him for the purpose of ascertaining his faith. The sick man began the conversation: "I have," says he, "lately taken to read the New Testament. I assure you, it is a very good book; but there is one article to which I could not accede: it is that of the eternity of future punishments. I cannot comprehend how this eternity is compatible with the goodness of God." The priest, it is said, explained the doctrine to the entire satisfaction of the poet, who, probably to free himself from the controversy, acknowledged that he was perfectly satisfied. As an effect of his conversion, he threw into the fire a theatrical piece which he had begun, confessed his forswear for his offences against morality and decorum, and gave up the profits of a new edition of his tales, then printing in Holland. The fact being related to the young duke of Burgundy, he was very generously ordered, that it was unreasonable that he should become poor for having done his duty, and sent him a purse containing 5,000 d'or. La Fontaine survived this illness, and passed about two years in the house of M. d'Hervart, who supplied the place of his former friend. He now undertook to translate some pious hymns, but did not succeed in this new species of composition. He died at Paris, in the year 1695, at the age of 73; and when he was moulded for interment, a fine cloth was found next to his fain. The best albums of his "Tales" are those of Amsterdam, 1675, and Paris, 1702. His "Tabl's" have passed through a vast number of impressions. Splendid editions of them with engravings, in 4 vols. folio, were published in 1755 and 1759. La Fontaine was author of many other works, as, "Les Amours de Pylée," a romance; "L'Florentin," a comedy; "L'Euvre," another comedy; "Astérophantes," "Lettres," and "Bons." D'Alembert has given his literary character in the following words: "If among the celebrated writers of the age of Lewis XIV. La Fontaine is not the greatest, he is at least the most irregularly original, the most an object of delight to imitators, and the writer whom it would cost the most pains to reproduce." His works, though uneven, have the charms of nature, which none of his contemporaries could acquire. They appear to flow from his pen spontaneously, and abound in grace and facility. His manner of narration is diversified with all the little touches which render description animated and interesting; and his reflections are just, natural, and appropriate. His memory was so highly respected by his country, that when his widow was insolvent for the payment of taxes that bore
hard upon her, an order was given that the family of La Fontaine should be for ever exempted from all public bur- thens; a privilege which has been granted to them ever since.

Fontaine, N. Cholat, a considerable French writer, the son of a taverner, was born at Paris, in the year 1625. He lost his father when he was twelve years of age, and was entrusted to the care of a relation, who was desirous of bringing him into public life by placing him under the patronage of cardinal Richelieu. The youth did not relish the proposal; he felt a stronger inclination for retirement and study, than for mixing in the muffle of the world; and resolved, if possible, to enter into the society of the Jesuits. At the age of 20 he accomplished his plan, and by a fe- dalous attention to the studies which were preferred to him, and by the excellence of his character and urbanity of his manners, he acquired the esteem, friendship, and con- fidence of the most respectable members of the society. He was, in a short time, appointed one of the tutors to the young persons sent to the Seminary, of which he was a member, for education. His leisure hours, and all that he could redeem from sleep, he devoted to theological studies. When M. Arnauld was expelled from the Sorbonne, and withdrew into privacy, M. Fontaine, already attached to him by the closest ties of friendship, readily followed his fortunes, and those of M. Nicole, for whom he acted as their secretary. He was also the friend and companion of M. Sacy, the disciple and nephew of Arnauld, and accom- panied him into places of concealment, where he took ref- uge from the persecutions of the Jesuits. In one of these they were discovered, and committed prisoners to the Bailli, where they were confined two years. After their liberation in 1668 or 9, their intimacy became stronger than ever, and continued unbroken till the death of M. Sacy in 1684. From this time Fontaine was obliged frequently to change his place of retirement, until he removed to Me- lun, where he died in 1709, when he had completed the eighty-fourth year of his age. He was the author of nu- merous works, published chiefly without his name, and sometimes with fictitious titles. The most important that are considered as belonging unquestionably to him are, "Illustrations of the New Testament," first published in 2 vols. Svo., and afterwards in 2 vols. 4to. "An Abridgment of St. Chrysostom on the Old and New Testament;" "The Lives of the Patriarchs, Prophets, and Saints," in several octavos. M. Fontaine was distinguished for great integrity, for the simplicity and innocence of his manners, and for unaffected modesty, humility, and piety. Morier.

Fontaine, in Geography, a town of France, in the department of the Upper Rhine, and chief place of a can- ton, in the district of Belfort. The place contains 261, and the canton 7,124 inhabitants, on a territory of 140 kilomètres, in 29 communes.—Allo, a town of France, in the department of the Vendée; 6 miles N.E. of Fontenay-le-Comte.—Allo, a town of Canada, on the S.E. bank of the lake St. Pierre. N. lat. 46°. W. long. 75° 40'.

Fontaine-le-Bourg, a town of France, in the depart- ment of the Lower Seine; 9 miles N. of Rouen.

Fontaine-le-Dun, a town of France, in the department of the Lower Seine, and chief place of a canton, in the dis- trict of Yvetot; 12 miles S.W. of Dieppe. The place contains 823, and the canton 10,448 inhabitants, on a ter- ritory of 165 kilometres, in 22 communes.

Fontaine-l'Eveque, a town of France, in the department of Jemappes, and chief place of a canton, in the district of Clauray; 3 miles W. of Clauray. The place con- tains 2,468, and the canton 11,245 inhabitants, on a terri- tory of 100 kilometres, in 12 communes.

Fontaine-Française, a town of France, in the depart- ment of the Côte-d'Or, and chief place of a canton, in the district of Dijon; 10 miles E. of la Turque. The place contains 1,920, and the canton 5,460 inhabitants, on a terri- tory of 157 kilometres, in 14 communes.

Fontaine-Guerin, a town of France, in the department of the Maye and Loire; 13 miles E. of Angers.

Fontaine-les-Joye, a town of France, in the depart- ment of the Eure; 60 miles N.E. of Evreux.

Fontaine-sur-Somme, a town of France, in the depart- ment of the Somme; 4 miles S.E. of Abbeville.

Fontaine de Vaucoulx, a town of France, in the depart- ment of the Vaucluse, from the residence of Petrarch and Laura; 15 miles E. of Avignon.

Fontaines, Peter Francis des, in Biography, a cele- brated French critic, was born at Rouen in the year 1685, where his father was a councillor of parliament. He re- ceived his education under the Jesuits, and obtained ad- mission into that order; but at the age of thirty, distilling the restraint attached to a clerical character, he quitted the society, and at the same time a cure he possessed in Normandy. Having excited some attention by his critical writings at Paris, the Abbé Bignon, in 1724, committed to him the conducting a distinguished periodical publication, entitled "La Journal des Scavans." While peacefully enjoying the fame and emolument of his literary labours, his numerous enemies, whom he had excited by the severe strictures on their works contained in that publication, determined on revenge; and they cruelly retaliated by accusing him of having been guilty of an unnatural crime; which expatriation on his character occasioned his imprisonment. He however- procured his liberty after fifteen days, and a justification of his conduct, in a letter from the magistrate, addressed to the Abbé Bignon, which tended to re-establish him in his former credit. The Journal having been suppressed by au- thority, he obtained permission to publish, in 1731, a similar work, under the new title of "La Nouvelle du Pamphlet, ou Réflexions sur les ouvrages nouveaux." But this only proceed- ed to two volumes, when the imprimator was also withdrawn, on account of the numerous and loud complaints of the various authors, lampooned, and held up to ridicule by the severity of its criticism. In 1735 he again entered the theatre of literary diffusion, and by assurances of more candour, and les personality, he procured a licence for an- other periodical publication, entitled, "Observations sur les écrits modernes;" which, after running to the protracted length of thirty-three volumes, was by order of government- silenced. But terrified by menaces, and intimidated by difficulties, in 1744 the critic appeared again in the path of science, and published his remarks in a weekly paper, called "Jugemens sur les ouvrages nouveaux," which proceeded to the eleventh volume under his direction; and the last two, thirteen, and fourteen, of that work were performed by fome other hand; he having been attacked with a disorder in his ched, that occasioned his death in 1745; on which occasion his enemy, Piron, wrote this satirical epitaph,

"Sous ce tombeau gît un auteur
Dont en deux mots, voici l'histoire
Il eut ignorant comme un predicateur,
Et malin comme un auditoire."

Besides his avocations in the voluminous periodical publi- cations, he found leisure to execute a variety of other works,
of which his biographer enumerates seventeen; some critical, some historical, and some transliterations. He published a prose translation of Virgil with plates by Chiscio in four volumes, 8vo., in which some critics have decided Virgil is either translated or murdered in every line. In 1754 a translation of Horace's odes appeared from his pen, and at different times from the same prolific source, sacred poetry, in imitation of the Psalms; Dictionnaire Neologique; a new Gulliver, in two volumes, a translation of Swift's Gulliver's travels; and portions from his other works, and those of Pope, Fielding, &c.

Vergil, who has drawn up his character, observes, that he was born a sentimental person, a philologist in conduct, as well as principle; except from ambition, and of a free and noble spirit, which would not bloom for titles or pretexts. In common conversation he appeared only a common man; but when any thing out of the ordinary way occurred, he discovered great discernment, force of imagination, depth of humour, and brilliancy of wit. The Abbé de la Porte published in 1757, "L'Esprit de l'Abbé des Fontaines," with a life annexed; and a catalogue of his writings, and those who wrote against him, in four volumes, 8vo., which see, and Nouveau Dictionnaire Historique.

FONTANA, Prospero. A painter of history, born at Bologna in 1512. Vasi mentions him as having been employed in 1556 to finish works left incomplete by Innocenza da Imola at Bologna, and he appears more as the fervent and attendant to others, than as the inventor of great works. He is introduced here principally, as having had the honour of offering into the world of art those two brilliant luminaries Amilare and Ludovico Carracci. It is not known when he died.

FONTANA, Latania, daughter of Prospero, practised portrait painting with very considerable success, under the patronage of Pope Gregory XIII. She died in 1602, at the age of 50.

FONTANA, Dominico, an eminent architect, was born in 1543 at a village on the lake of Como. Having acquired the elements of geometry, he went to Rome, where his elder brother John was a student in architecture. Here he applied himself most diligently in studying the works of antiquity, and at length was employed by cardinal Montalto, afterwards pope Sixtus V. Montalto had already begun to display the magnificence of his character, by undertaking the construction of the grand chapel of the manger in the church of St. Maria Maggiore. The pope, Gregory XIII, jealous of the munificence of his cardinal, took from him the means of his designs, and thus put a stop to the works. Fontana, with a spirit worthy of a great man, went up with the building at his own expense, which he projected to the cardinal, that when he was raised to the popedom, he created Fontana his architect. The chapel and palace were finished in a splendid style, but this was a small part of the vast designs projected by Sixtus. Besides completing the dome of St. Peter's, he relished to contribute to its grandeur by conveying in front of its piazza the obelisk of a single piece of Egyptian granite, which had formerly decorated the circus of Nero. This design had been contemplated by some of the predecessors of Sixtus, but none had actually attempted it. Sixtus summoned the architects and engineers from all parts, to consult on the best means of effecting the business. Fontana's plan obtained the preference, and he was able to perform in practice what he had in four or five years. This was regarded as the most splendid exploit of the age, and rewards and honours the most magnificent were bestowed upon Fontana and his heirs. He was afterwards employed in the elevation of other obelisks, and in the embellishment of the principal streets of Rome. He built the Vatican Library, and began considerable additions to that palace, which were interrupted by the death of Sixtus.

One of Fontana's great works, was the conducting water to Rome from the distance of fifteen miles, in a channel supported upon arches. The successor of Sixtus, Clement VIII, was prejudiced against the papal architect, and dismissed him from his office, but his reputation caused him to be engaged by the viceroys of Naples as architect to the king. He accordingly removed to Naples in 1552. Here he undertook and executed many works of consequence. His last efforts were directed to a new harbour for Naples, which he did not live to finish. He died at Naples in 1627 in his sixty-fourth year, Gen. Log.
The town is built in the form of an amphitheatre, upon a hill which faces the sea, and in the fourth angle of the gulf of Gaflony. It has a governor, a king's lieutenant, or major, an aide-major, and a garrison, more or less numerous at different times. N. lat. 43° 23'. W. long. 1° 55'.

FONTELLO, a town of Portugal, in the province of Beira; 4 miles N.E. of Lamego.

FONTEHAY, Peter Claude, in Biography, a French Jefuit, was born at Paris in 1689, and entered on his novitiate in the order when he was fifteen years of age. Having completed his initiatory studies, he was employed some time to furnish extracts and remarks on books relating to religion and ecclesiastical history in the "Journal de Travaux." He was engaged for some years in collecting materials for writing a history of the popes, in which however he made but small progress. His attention to ecclesiastical history did not prevent him from pursuing the lighter studies of polite literature, in which he excelled, and as the result of those pursuits, he published various small poems in the collections of the day. His studies and learning pointed him out as a fit person for rector of the Jefuits'college at Orleans, where he continued till the year 1715, when he was recalled to Paris, and appointed to continue, Longueval's "History of the Gallican church." Eight volumes of this work had been already published, and Father Fontenay proceeded with it till the twelfth, when he was incapacitated for further progress in the undertaking by a paralytic stroke. He survived the stroke but twelve months, and died at the college La Flèche, in the year 1744, in the fifty-sixth year of his age. Moret.

Fontenay, in Geography, a town of France, is in the department of the Two Seines, and chief place of a canton in the district of Nioit. The place contains 1,235, and the canton 6,183 inhabitants, on a territory of 14.246 square, or 10 communes.

Fontenay-le-Comte, a town of France, and chief place of a district, and capital of the department of Vendée, situated in a fertile valley on the Verdée. The place contains 6,660, and the canton 15,283 inhabitants, on a territory of 147.6 square, or 15 communes. The chief articles of commerce of the inhabitants are cloth, woollen stuffs, and cattle, of which they sell a great number at the three annual fairs. N. lat. 46° 50'. W. long. 0° 24'.

Fontenelle, Bernard le Bovier de, in Biography, a man of letters, was born at Rouen in 1657. He was educated among the Jefuits, and became, at a very early age, distinguished for the progress which he made in polite literature. He studied the law as a profession, but leaving his right hand in the courts, he renounced the bar, and devoted himself entirely to literature and philosophy. In 1674 he visited Paris, and became known as a poet; and in 1683 he published "Dialogues of the Dead," in two volumes. These were well received, and proved a happy specimen of his talent of combining morality and literature with the graces of elegant and ingenious writing. Three years afterwards he published his most popular work, entitled, "Entretiens de la Pluralité des Mondes." In this little piece, which has been translated into all languages, science and philosophy are united with vivacity, gallantry, and delicate humour. The next production of Fontenelle was "The History of Onæus," which appeared in 1674, and which exposed the author to the suspicion of infidelity, because he opposed certain dogmas held by the clergy as sacred. He published, in the year 1688, "Pastoral Poems, with a Difcourse on the Elocution," and in 1692 and the following year the opera of "Thetis and Pienus," and "Aneas and Lavinia," which met with a considerable share of
in popularity. In 1690 he was admitted into the French academy; and in 1699 he was elected secretary of the academy, a post which he occupied forty-two years. In this situation he wrote a history of that body, of which he published a volume annually, containing extracts and analyses of memoirs, and eulogies of deceased members. Fontenelle was author of many other pieces, of which the principal are, "L'Histoire du theatre Francois jusqu'à Corneille," "Réflexions sur la Poësie du theatre, et du theatre Tragique;" "Elements de Geometrie de l'Infinit;" a tragedy, and some comedies. His constitution was originally and naturally delicate, yet he reached the great age of four score years and ten, with no other infirmity than that of deafness. After this his fight began to fail him; but he lived till he had nearly completed a century. A short time before he expired, he was asked by his physician if he felt any pain; "I only feel," he replied, "a difficulty of existing." He died January 9, 1757. Fontenelle, says his biographer, "as a poet, did not rise beyond elegance and ingenuity; as a man of science, he excelled more in elucidating the inventions of others, than in discovering new truths. In the commerce of life he was truly a philosopher; florid of his own happiness, yet without sacrificing the duties of a man of honour and virtue. In his conversation he was guarded; in his actions firm and decided. He often gave an honest vote in a minority at the academy, and was the only one who had the courage to vote against the exclusion of the abbe St. Pierre from its meetings, when he had been declared guilty of treating the memory of Louis XIV. with disrespect. He had many friends; and, in the latter part of his life, fearlessly an enemy."

The works of Fontenelle, with the exception of those on geometry and physics, have been collected in eleven volumes, 12mo, under the title of "Œuvres Diverses." Moretti.

Fontenelle, the most pleased and allowing writer on subjects of history, criticism, and philosophy, was so totally inoffensive to music, that, like our Pope, he wondered how its votaries could be so delighted with it. Pope ascribed all the pleasure expressed by the admirers of the art to affectation; while Fontenelle, ignorant of its objects, concerning which his ears afforded him no information, cried out, "Savate, que vant tu?" and this humble question has passed for a bon mot among scoffers ever since. The forna personified might have answered, "I would have you listen with attention to the sweetness of the harmony, the grace, spirit or pathos of the melody, and the ingenuity of the composition." But it is wonderful that so intelligent an author should write dramas for music, without knowing what music meant: yet, when no more than twenty years of age, he produced Plièche, and Bellerophon, two famous operas for the lyric theatre, and which were set by Luili in 1681; Pélus and Thésis, another famous opera; for what he could not understand; in 1689, Jennes and Latavina; and in 1731, Endymion; and all these dramas were to be translated into melody, a language of which he knew not the alphabet. He used to say that the ancient music of the Greeks could never be recovered, or similar effects produced by the moderns, unless the poet and musician were united in one and the same person, for, he had read that Sophoehles and Euripides set their own dramas to music. Metattalio was more modelled and more reasonable; for, upon being asked if he had ever met any of his own dramas to music, he answered in the negative, alluding as a reproof, that music was now become so difficult and complicated a study, that a man of letters had not leisure sufficient for its cultivation; as it is necessary now not only for an opera composer to be possessed of genius, taste, invention, and knowledge of counterpoint, but he should know the peculiar art and power of different voices, the scale and genius of different instruments, and sing in good taste, though without a voice. Pope, whose aural organs were too obtuse to vibrate in unison with musical tones, wrote a beautiful ode for music on St. Cecilia's Day, and Addison not only wrote an ode, but an opera for music, both as ignorant of its meaning as Fontenelle. These admirable writers, who, on subjects within their competence, from beings of a superior order, only degrade themselves to a level with the common maze of mankind, in condemning what they neither feel nor understand. No one is ashamed to own that he is near-fighted: none will allow that their apathy and contempt for music arise from an imperfect organization. There is an ear for music, an eye for painting, and a voice for song, with which those who hear, see, and talk well enough for the common purposes of life, are not gifted. Dr. Johnson, who had no ear for music, and tried to have some pleasure in humbling those whom he thought vain of their musical talents, seeming to hang over the harpsichord as if he were listening to the sounds, being told by the performer that he hoped he would grow fond of music at last, the great philologist said, "Sir, I shall be glad to have a new feline given me!" which was candidly affording his contempt for music to its true caufe. Fontenelle, whose style in his prose writings was the most ingenious, elegant, playful, and correct, of any author who contributed to embellish the splendid and literary reign of Louis XIV., was nephew to the great Corneille.

FONTENAY, in Geography, a village of France, in the department of Jemappes, famous for a title which was fought near it between the French and the Allies, in May 1745; the allies and English were commanded by the duke of Cumberland, and the French by maréchal Saxe. The allied army left 12,000 on the field of battle, and the loss of the French was not much less; 4 miles S.E. of Tournay. — Also, a town of France, in the department of the Meuse; 8 miles N.E. of Toul. — Also, a town of France, in the department of the Aisne, on the Aisne; 5 miles W. of Soissons.

FONTES, a town of France, in the department of the Herault; 13 miles N. E. of Beziers.

FONTEVRAUD, a town of France, in the department of the Mayenne; famous for an abbey, in the church of which several kings and queens of England were buried; 6 miles E. of Saumur.

FONTEVRAULT, in Ecclesiastical History, an hermit priory of order of monks and nuns, 13 which, contrary to others of a similar complexion, the weaker sex has allowed the pre-eminence. It was founded four years after the celebration of the council at Reims in the year 1190, by Robert d'Arbrissel; who was archbishop of Reims, and then received a particular visita, from pope Urban II., to become an itinerant preacher, for the better instruction of profiting Christians. Having been very successful, and persuaded numbers, both men and women, to devote themselves to a monastic life, he erected for their accommodation cells in the woods of Fontevraud, three leagues from Saumur, on the confines of Poitiers, in France. After lodging the women in separate apartments, and subjected the men to the control of the abbess, in honour of that portion of sacred history written by St. John in the 19th chapter of his gospel; he placed the whole order under the rules of St. Benedict, only adding some particular constitutions; and appointed this house to prelude over the whole. Pope Paul
on the latter from fire." Hence he has given it the name of *antipyretica* and hence some have supposed it incombinable, for which there is no foundation, except perhaps when it is thinly encrusted all over with earth. Its use can be accounted for sufficiently, by its being a bad conductor of heat, and excluding the passage of air.


3. *F. capillacea*. Brittly Water-moss.—Leaves linear-bristle-shaped. Spreading. Scales and fruitstalks elongated, thread-shaped; the scales acute, reaching beyond the capsule.—Duck. Crypt. falc. 2. 1. Sm. Fl. Brit. 1572. With. 789. Hull. 275. (F. capillacea, calycibus fityliformibus capitatis; Dill. Mufc. 260. t. 33. f. 5.)—Native of the alpine rivulets of Scotland, where it was discovered by Mr. Dickson. The celebrated John Bartram sent it to Dillenia from Pennsylvania. This is of a dull olive green, scarcely shining, and is known by its long leaves with capillary points, which spread nearly equally in all directions. The long fruitstalks, invetted with the close flender sheaths, are also remarkable, and readily distinguish it from the foregoing.

4. *F. falicata*. Sickle-leaved Water-moss.—Leaves ovate, lanceolate, taper-pointed, in three rows, curved to one side. Fruitstalks elongated, half naked.—Hedd. Sp. Mufc. 299. Crypt. v. 3. 57. t. 24. Swartz. Mufc. Succ. 72. (F. capillacea; Linn. Fl. Suec. 379. Ebrh. Crypt. 257.)—Found in mountainous rivulets in Sweden. Einhart gathered it near Upfal. Much less slender than the last, from which it is essentially distinguished by the sickle-shaped leaves, curved all one way, and the nakedness of the upper part of the fruitstalk, whose sheaths seldom reach further than their middle. Linnaeus noticed this for the plant of Dilennis, quoted under our last species, on which, without seeing a specimen, he had previously founded his own *F. squamosa*. He tells us in the Flora Suecica, ed. 2, he had not the plant at hand when he wrote that book, but adopted it from Olaus Celsius.

The *F. pennata* of Linnaeus is *Nekera pennata*, Hedd. Crypt. v. 3. 47. t. 19, a most elegant moss, erroneously supposed to have been found in England.

Concerning *F. minor*, Linn. Sp. Pl. 1571, there has been much doubt and controversy. The plant of Dilennis and of British writers, from which the Linnaean specific character, of the terminal fructification, was taken, is *Tricleftum foniculaculatwm* of Hedw., and of Fl. Brit. 1248. This is what grows at Oxford and in the Thames, and is figured in Engl. Bot. t. 357. But the herbarium of Linnaeus contains a specimen, gathered at Upfal, marked by him *minor*, which is certainly different, though probably only a variety of *F. antipyretica*. This is what he described in the second edition of *Species Plantarum*, "leaves folded so as to form a keel, two together on the thicker branches." There are no capsules on the specimen, but some appearance of axillary male flowers. As the acute and active cryptogamists of Sweden have not since detected this plant
at Upsal, we must conclude it to be an evanescent variety of
the first species. The Swifs botanists have been no less
puzzled than Linnaeus about F. minor. What Favrod and
others have taken for such, and which they contend is Hal-
ler's Hypnum, n. 1795, appears to us not different from
Hypnum rufifolium, Fl. Brit. 1292. Possibly, from his
quotation of Dillenius, Haller might mean our Trichefomum
fontinalidet; but on this little dependance can be placed,
as under his very next species, n. 1796, which is An：han-
gium aquaticum of Hedwig, Hypnum aquaticum Jacq. Austr.
t. 290, (as the late Mr. Davall first suspected), Haller
quotes the synonym which belongs to Fontinalis squamosa, a
widely different moss. The synonyms of this eminent writ-
er indeed require much correction, even in his Nomenclator,
where he is supposed to give only the most obvious and indu-
bitable. S.

FONTINELLE, in Geography, a town of Walachia,
on the Danube; 18 miles E. of Nicopoli.

FONTIVEROS, or Hortiveros, a town of Spain, in
Old Castile; 10 miles N.N.W. of Avila.

FOOD. For the substances capable of affording nutriment
to man, see Digestion; and for information relative to the
quality and quantity of those substances to be taken with a
view to the prevention and cure of diseases, see Diet.

END OF VOLUME XIV.